KPMG

Project Report

BRITISH COLUMBIA - AN ANALYSIS OF COMPETITIVENESS ISSUES FOR HIGH-TECH FIRMS

Prepared for

Province of British Columbia
Information, Science and
Technology Agency
Victoria, British Columbia

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I

Introduction And Summary

This report provides information on British Columbia's (BC) fast-growing high-technology sector, as an introduction to BC for high-tech firms that may be interested in investing in BC. It presents:

- A portrait of the types of business which make up BC's high-tech sector.
- A summary of growth trends in BC's high-tech sector.
- A comparison of BC and US high-tech centres, in terms of both business and personal cost factors.
- A summary of strategic advantages for high-tech firms locating in BC.

This report has been independently prepared by KPMG Consulting LP, with sponsorship from the Government of British Columbia. All findings are those of KPMG, and reflect primary and secondary research by KPMG and other firms on projects undertaken between September 1997 and January 2000.

A. Portrait of BC's high-tech sector

BC's high-tech sector is dominated by knowledge-based services such as engineering, information technology, and environmental services. The major high-tech manufacturing industries are electronics and electrical products, including computer and automation systems, advanced electrical power equipment, and advanced fuel-cells. Aerospace and biotechnology are growing niche areas.

The majority of BC's high-tech businesses are small domestic firms, but there is also a growing presence of major international firms. IBM, Motorola, Hewlett-Packard, and Electronic Arts are among the major technology firms represented in the province.

B. BC high-tech: a fast-growing industry sector

High-tech is one of the fastest growing sectors of BC's economy. The sector employed more than 46,000 people in 1998 (latest official figure[1]), a 47% increase from five years earlier.

Leading international forecasts predict continuing global growth in the high-tech sector, including key sub-sectors in which British Columbia has a strong niche position—information technology, wireless telecommunication, and biotechnology. Given this picture, the high-tech sector is confidently expected to experience continuing growth in the years to come. If historical trends continue, by 2005 British Columbia's high-tech sector could provide between 60,000 and 70,000 direct jobs.

C. Comparative costs in BC and US high-tech centres

1. Business costs

A detailed KPMG study of location-sensitive business costs has quantified the cost competitiveness of high-technology operations in Vancouver in relation to seven major US high-tech centres. In comparison to seven US high-tech centres, Vancouver enjoys:

- A 6% after-tax cost advantage over Raleigh, the lowest-cost US centre.
- A 10% after-tax cost advantage over Seattle, the nearest US centre.
- A more-than-15% after-tax cost advantage over San Jose, the highest-cost US centre.

Factors contributing to BC's cost advantage include:

- Labour costs in BC for high-tech occupations, including employee benefits and payroll taxes, are lower than in the US high-tech centres examined.
- Construction costs for manufacturing facilities are lower in Vancouver than in six of the seven US high-tech centres examined.

[1] *Source: Profile of The British Columbia High-technology sector, 1999 Edition. BC Stats and Statistics Canada, pg. 44.*

- High-tech firms based in BC benefit from much more generous R&D tax incentives than their counterparts in the US, reducing effective corporate income taxes to a competitive level with the US cities examined.

2. Personal costs

A study of personal costs in Vancouver and the seven US high-tech centres by Matthew Fischer and Associates and Runzheimer Canada Inc. examines the issue of Vancouver's higher personal income taxes in the perspective of overall cost of living.

While income tax levels are higher in Vancouver than in all seven US centres, the costs of consumer goods and services in Vancouver are as low or lower than in the US centres. With the exception of San Jose, which has the highest total cost of living (including taxes) at all income levels, high-technology employees tend to experience a higher personal cost of living in Vancouver than in competing US jurisdictions. However, at the $50,000 and $100,000 income levels, the total cost of living in Vancouver, including personal income taxes, is not materially different from Portland or Seattle, the two other Pacific Northwest cities examined in this analysis.

D. Strategic advantages for high-tech firms locating in BC

In addition to low business costs, British Columbia also offers a number of other strategic advantages to high-tech firms, including:

- A high-quality existing labour force, combined with a streamlined immigration system that expedites the international recruitment of professional and technical talent.
- An advanced education system offering a large number of technology-related courses at every level and a network of research centres
- Strong industry organizations which work to promote the ongoing growth of their respective industries.
- A geographic location that represents an international business, transportation and communications gateway between Asia Pacific and North America, and that offers an outstanding quality of life.
- A wide variety of government and other programs designed to help foster the high-tech sector.

II

Portrait of BC's High-Tech Sector

The high-technology sector in British Columbia has a number of defining characteristics[1]:

- **Predominance of small companies.** Almost 97% of business establishments had less than 50 employees in 1998, and the majority of firms were locally-owned. There is, however, a growing presence of global firms, such as IBM, Motorola, Hewlett-Packard, Compaq, and Electronic Arts.

- **Specialization in knowledge-based services and electronics.** Engineering, computer, and scientific services accounted for approximately three-quarters of total high-tech activity in 1998. High-technology manufacturing represented almost 21%.

- **Geographic concentration.** High-tech activity is heavily concentrated in and around Vancouver (61% of total establishments), with secondary concentrations in and around Victoria (10%), and in the province's southern interior (9%).

- **Sectoral diversity and niche-focus.** British Columbia companies and institutions have developed world-class, niche capabilities in a broad range of high-tech segments including information technology, aerospace, subsea engineering, environmental technologies, biomedical engineering and biotechnology.

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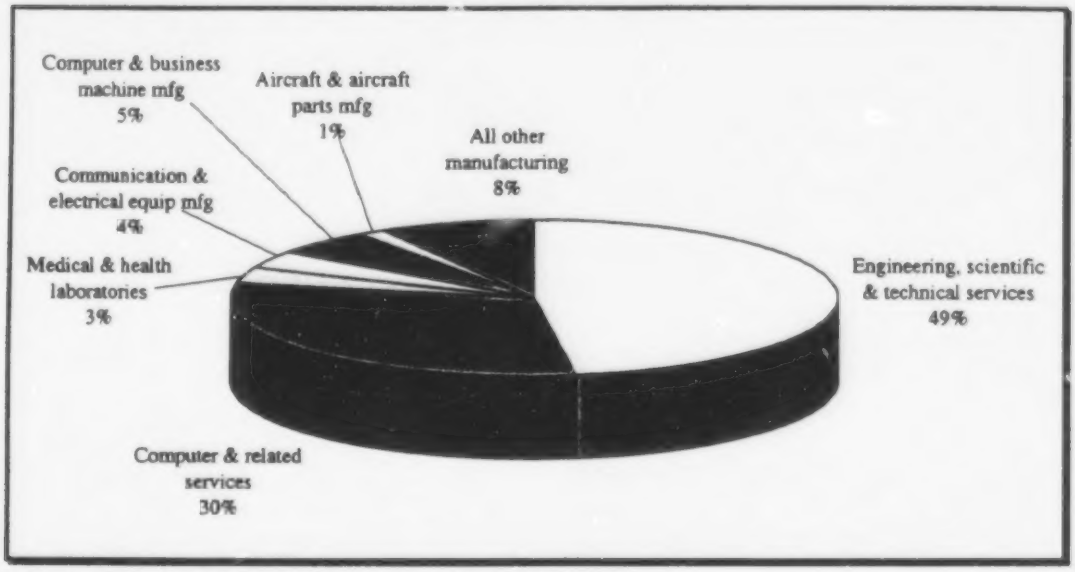
[1] *This section is based on the Profile of the British Columbia High-technology sector 1999 Report, by BC Stats and Statistics Canada.*

In 1998, there were over 6,800 high-tech firms operating in BC. Exhibit II-1 shows the breakdown of high-tech activity, measured by GDP. The chart illustrates clearly the large contribution of knowledge-based services (81% of total high-tech GDP in 1997), relative to manufacturing.

Exhibit II-1
BC high-tech GDP, by sub-sector, 1997


Computer & business machine mfg 5%
Aircraft & aircraft parts mfg 1%
All other manufacturing 8%
Communication & electrical equip mfg 4%
Medical & health laboratories 3%
Engineering, scientific & technical services 49%
Computer & related services 30%

Source: Profile of the BC High-technology sector 1999, *Detailed Table 1.*

The following sections highlight BC's capabilities in selected sub-sectors based on the high-tech industry segments identified in Exhibit II-1 above. These sections identify key players in specific industry segments, and profile a cross-section of companies representing various parts of the province[1].

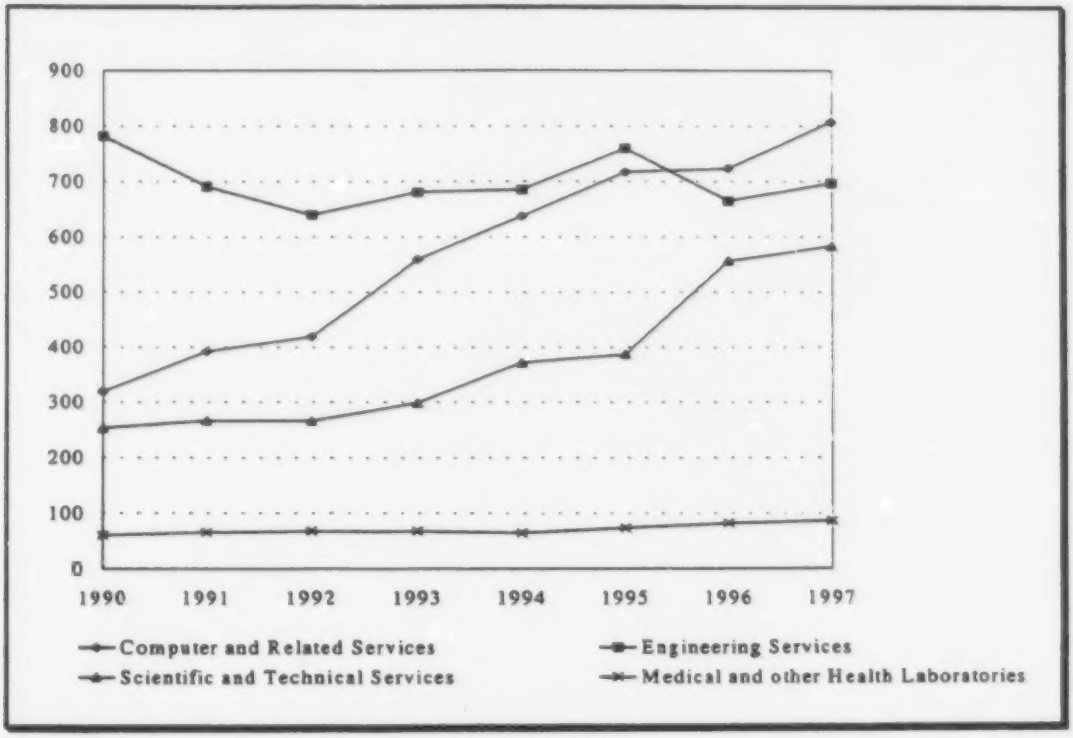
[1] *Sources: Business in Vancouver Book of Lists, 1999, a telephone survey conducted in December 1999 and company web sites. All information pertaining to individual companies is subject to change.*

A. Engineering, scientific and computer services

The computer service segment is the largest of BC's high-technology service industries. The GDP contribution of computer services increased 93% between 1990 and 1997, with the highest growth rate of all the high-tech service industries.

Exhibit II-2 demonstrates the performance of the four service sectors over seven years.

Exhibit II-2
BC high-tech GDP at factor cost, by industry (1992 constant C$ millions)



Source: Profile of the BC High-technology sector 1999, *Detailed Table 1.*

All sectors have grown steadily with the exception of Engineering Services, whose 1997 GDP was just below that which it achieved in 1995. One small but rapidly-growing service segment is the environmental-technologies industry, which includes remediation services, industrial eco-efficiency, alternative energy and fuels, transport-related emissions control, and measurement instrumentation and informatics.

Exhibit II-3 provides examples of high-tech service firms in British Columbia, and illustrates the variety of services being provided in the province.

Exhibit II-3
Examples of BC high-tech service firms

Company	*No. of BC Employees*	*Business Focus*	*Year Founded*
ISM-BC	1,400	Systems integration, network-station management, integrated electronic commerce	1991
AGRA Simons	1,000	Industrial engineering services	1944
Seagate Software	650	Data management and business intelligence software	1984
Electronic Arts	580	Multimedia software & video games	1982
Sierra Systems	370	Business software solutions	1966
Kvaerner Chemetics	250	Process technologies for resource industries	1964
Newbridge Networks & affiliates	150	Network access products (ATM, Internet, frame relay), multimedia and video-conferencing	1986

Source: Book of Lists, *Business in Vancouver, 1999; self-reported employment data; and company web sites.*

BC has developed considerable software and computer systems engineering expertise in some of the fastest-growing fields of information technology: telelearning, multimedia, internet applications, information management systems, network design, and systems integration. Newbridge Networks, EDS Systemhouse, IBM and DMR Consulting are examples of information technology companies which have located or expanded in BC.

BC universities have excellent research capabilities in software systems and engineering, multimedia, computer graphics, and telelearning. For example, the University of British Columbia (UBC's) Media and Graphics Interdisciplinary Centre (MAGIC) is actively involved in digital post-production and the development of educational video games, while Simon Fraser University (SFU) has developed a commercial server-based software system (Virtual-U) for the delivery of educational and training programs.

Research facilities and resources outside the university environment include the Software Productivity Centre (software engineering tools and libraries), the Advanced Systems Institute, and the Centre for Digital Imaging and Sound.

Mini-Profile—Electronic Arts Canada

Electronic Arts (EA) is the number one interactive entertainment software company in the world. Headquartered in Redwood City, California, EA is a global company known for its realistic multimedia games for personal computers and entertainment systems such as PlayStation™ and Nintendo® 64. Sports games incorporating true-to-life interactive animation, including FIFA Soccer, NBA Live, NHL® Hockey, Triple Play Baseball, Tiger Woods and the PGA TOUR™ Golf, and Need for Speed driving simulations are among EA's top selling titles.

Burnaby, BC, is home to Electronic Arts' Canadian operations and one of its thirteen world-wide studios. To accommodate the company's ongoing growth and its 580 staff, Electronic Arts moved into a new state-of-the-art development studio in January 1999. Using advanced motion capture digital technology, the EA studio converts video sequences of world-renowned athletes into complex mathematical models, and then creates true-to-life animation characters.

B. Biotechnology and biomedical industries

BC's biotech-biomedical industry is in its infancy, but is growing rapidly. The BC Biotechnology Alliance estimates that there are currently over 80 biotech firms in the province.

BC's major strengths in the biotech and biomedical field are:

- Cancer and infectious-diseases therapeutics.
- Cancer detection.

The University of British Columbia, the province's largest university, has a strong reputation in life-sciences research and an active technology-transfer program. The Centre for Environmental Health at the University of Victoria primarily investigates genetic mutation, the evolution of immune-system genes and the biotechnology of viruses. Simon Fraser University's research strengths are developmental genetics, molecular evolution and cellular signal transduction. The university is also a leader in the design and fabrication of micro-machined devices with biotech applications.

Important institutional resources for research that are closely affiliated with the university system are the BC Cancer Research Agency and the clinical-trials unit of Vancouver General Hospital. In addition, the BC Institute of Technology's Biotechnology Program provides training for the specialized technicians who are essential to the industry's R&D and clinical evaluation work.

Exhibit II-4 details a small sample of biotechnology and biomedical firms in British Columbia.

Exhibit II-4
Sample of BC biotechnology and biomedical firms

Company	*No. of BC Employees*	*Business Focus*	*Year Founded*
QLT Photo Therapeutics	264	Photo-dynamic anticancer therapies	1981
International NewTech Development	86	Clinical diagnostic tests and biotech pharmaceuticals	1991
StemCell Technologies	81	Tissue culture and cell separation reagents	1993
StressGen Biotechnologies	67	Anticancer and infectious diseases vaccines, cellular stress response technologies	1990
Inex Pharmaceuticals	63	New generation drug delivery systems	1992
Xillix Technologies	20	Fluorescence-imaging cancer detection	1988

Source: Book of Lists, *Business in Vancouver, 1999; self-reported employment data; and company web sites.*

Mini-Profile—StressGen Biotechnologies Corp.

StressGen Biotechnologies, founded in 1990, is BC's fourth-largest biotech firm, currently employing 67 people. The company is based in the provincial capital, Victoria. StressGen researches, develops and distributes medical therapies for the treatment of cancer and vaccines for the prevention of infectious diseases. These products are based on a powerful class of natural molecules, called stress proteins, that are critical to the activation and control of the immune system. StressGen was the first company to focus exclusively on developing medical treatments using this technology, and remains a leader in the field.

C. Communication and electronic equipment manufacturing

Communication and electronic equipment manufacturing form the core of high-tech manufacturing in BC. These industries produced 34% of all BC high-tech goods and employed 38% of BC high-tech manufacturing workers in 1998.[1]

The main industry segments are:

- Telecommunication hardware and software, with a focus on wireless communications, satellite systems and networking technologies.
- Electrical equipment and energy technologies including lithium cells, power converters and zero-emission energy technology.

[1] *Source: Profile of the BC High-technology sector, 1999 Edition, Detailed Tables 5&6, BC Stats*

1. Communications equipment firms

Exhibit II-5 provides examples of communications equipment firms in BC.

Exhibit II-5
Examples of BC communications equipment firms

Company	*No. of BC Employees*	*Business Focus*	*Year Founded*
PMC Sierra	426	High-speed internetworking component solutions	1984
MDSI Mobile Data Solutions	296	Wireless connectivity applications	1993
Glenayre	240	Mobile personal telecom equipment and software	1963
Spectrum Signal Processing	125	Digital signal processing hardware and software	1987
Hewlett-Packard	115	Communications protocol-test tools and systems engineering support	1966
Norsat International	110	Satellite and broadcast communications systems	1982

Source: Book of Lists, *Business in Vancouver, 1999; self-reported employment data; and company web sites.*

Mini-Profile—PMC Sierra

PMC-Sierra is a leading provider of internetworking semiconductor system solutions, emphasizing ATM, SONET/SDH, T1/E1 and T3/E3 applications for high speed transmission and networking. As co-founder of the SATURN Development Group, PMC-Sierra works with over 30 other member companies to define and develop interoperable, standard-compliant solutions for high speed networking applications. The company, headquartered in Burnaby, BC, supports a highly skilled workforce. PMC-Sierra offers world-wide technical and sales support and has design centres throughout North America.

2. Electronics and energy equipment firms

Exhibit II-6 provides examples of electronics and energy equipment firms in BC.

Exhibit II-6
Sample of BC electronics and energy equipment firms

Company	*No. of BC Employees*	*Business Focus*	*Year Founded*
Ballard Power Systems	750	Clean-fuel cells for vehicles and stationary power plants	1979
Xantrex Technologies	264	Electronic power conversion equipment	1983
Aimtronics	240	Advanced electronics	1987
Vortek Industries	28	Ultra-power arc lamps and optical beam technology	1975

Source: Book of Lists, *Business in Vancouver, 1999; self-reported employment data; and company web sites.*

Mini-Profile—Ballard Power Systems

Founded in 1979, BC's Ballard Power Systems is acknowledged as the world leader in developing, manufacturing and marketing zero-emission proton-exchange membrane fuel cells. (Although not strictly an electronic products firm, the electro-chemical nature of Ballard's technology warrants its inclusion in this category). By 1999, the company was employing approximately 750 staff in BC.

Ballard's technology is currently being used by leading international companies such as Daimler-Chrysler, General Motors, Honda, Nissan, Yanaga, Volkswagen, Ford, Hyundai, and Matsushita Electric Works to develop zero-emission vehicles and environmentally-clean stationary electric power plants.

Ballard is partnering with strong, world-leading companies, including Daimler-Chrysler, Ford, GPU International, ALSTOM and EBARA to commercialize fuel cells for use in transportation, electricity generation, portable power and other products. Daimler-Chrysler unveiled the world's first methanol-fuelled car powered by Ballard Fuel Cells at the 1997 Frankfurt Auto Show.

In 1999, Ballard announced that it would work with Petro-Canada and Methanex to prepare for the establishment of a commercially viable fuel distribution network for fuel cell powered vehicles.

D. Computer and business machine manufacturing

This industry sector produced 26% of all BC high-tech goods and employed 17% of BC high-tech manufacturing workers in 1998.[1] The main industry sub-segments include computer hardware and software for business automation, electronic data interchange and computer-integrated manufacturing systems.

BC's institutional research infrastructure in electrical, computer and industrial engineering fields is highly developed and industry-oriented. Areas of expertise include: VLSI design and microelectronics; manufacturing automation systems and software; electrical power engineering; microscopic CMOS devices; microwave applications of superconductors; analog optical-fibre systems and ultra-high-speed microchips.

Two products of recent research at Simon Fraser University with significant commercial potential are a microprocessor that controls viewer-access to TV programming (the "VChip") and a sensor control for the deployment of automobile air bags.

Exhibit II-7 details a sample of computer and business machine manufacturers in BC.

Exhibit II-7
Sample of BC computer and business machine manufacturing firms

Company	*No. of BC Employees*	*Business Focus*	*Year Founded*
CREO Products	1,200	Computer-to-plate printing technology	1983
CAE Newnes Ltd.	564	Optimization and automation systems for forest-products manufacturing	1912
Seanix Technology	195	Design and manufacture of PCs and motherboards	1986
Epic Data International	172	Design, manufacture and integration of enterprise-wide systems	1975
Brooks Automation Canada	90	Industrial control systems for semiconductor manufacturing	1983
Compaq	70	Alpha and Intel personal and micro computers	1967

Source: Book of Lists, *Business in Vancouver, 1999; self-reported employment data; and company web sites.*

[1] *Source: Profile of the BC High-technology sector, 1999 Edition, Detailed Tables 1&6, BC Stats*

Mini-Profile—Creo Products Inc.

Creo Products Inc. (Creo) located in Burnaby, is the world's leading supplier of computer-to-plates systems. Creo produces advanced hardware and software systems that transfer computer files to printing plates in a single step, thus eliminating the need for costly film and complex film processing. Digital files flow directly from a computer to an output device that makes printing plates, hence the term "computer-to-plate" (CTP). Since introducing CTP technology, and then thermal CTP in 1995, Creo has been setting the standard in the graphic arts industry with innovative digital prepress solutions.

E. Aircraft parts and aerospace industry

The aerospace industry in BC has two major segments:

- Aircraft parts and components manufacturing.
- Aerospace systems including aviation information systems, air traffic management, remote sensing, and space-vehicle systems.

In 1997, aircraft parts and components manufacturing accounted for approximately 12% of high-tech manufacturing revenues in British Columbia[1]. Avcorp Industries, the province's largest aircraft parts company, designs and manufactures structures for Boeing, Bombardier's Canadair division, and Airbus aircraft.

University-based research support available to the aerospace sector includes expertise in advanced manufacturing, systems design, and software engineering. BC's universities also have aerospace-specific capabilities, including the University of Victoria's Space and Subsea Robotics Lab and the University of British Columbia's IRIS Spacecraft Controls Lab.

[1] *Source: Profile of the BC High-technology sector, 1999 Edition, Detailed Table 5, BC Stats*

Exhibit II-8 provides examples of aircraft parts and aerospace firms in British Columbia.

Exhibit II-8
Examples of BC aircraft parts and aerospace firms

Company	*No. of BC Employees*	*Business Focus*	*Year Founded*
MacDonald Dettwiler	750	Air-traffic management and information systems, remote-sensing, space-vehicle systems	1969
Avcorp Industries	600	Aircraft structures and components	1986
Kelowna Flightcraft	502	Avionics upgrade-systems design and integration	1970
Conair Aviation	400	Specialty aviation products and services	1969
Viking Air	130	Aircraft components	1970
Northern Airborne Technology	111	Aircraft communications and audio management systems	1979

Source: Book of Lists, *Business in Vancouver, 1999; self-reported employment data; and company web sites.*

Mini-Profile—Northern Airborne Technology Ltd.

Northern Airborne Technology Ltd. (NAT), located in the southern-interior city of Kelowna, is an example of the many small high-tech firms in BC that have earned international recognition in niche-markets.

The company designs and manufactures specialized audio-management and communications equipment for aircraft and helicopters engaged in search and rescue, law enforcement, air-ambulance and news-gathering, and more recently military and marine programs. NAT's audio systems provide superior performance and reliability in high-noise environments and can be customized to individual specifications. This small company has complete in-house CAD-CAM capabilities, as well as environmental and EMI (electro-magnetic interference) test facilities.

NAT recently negotiated a $6-million contract with the German air force for a custom intercom and audio management system.

Mini-Profile—MacDonald, Dettwiler and Associates

Founded in 1969 by a local group of engineers-entrepreneurs, MacDonald Dettwiler and Associates Ltd. (MDA) is today one of BC's most successful high-tech enterprises, and a world-leader in land information. The majority (85%) of non-military earth observation centres installed world-wide are either turnkey MDA facilities, or incorporate the company's technology. MDA employs 750 people in BC and over 1500 world-wide.

MDA provides systems engineering and information services across multiple international markets including Earth observation technologies, land information systems, mapping and geomatics services, spatial information systems, space, aviation, defence applications, and online information systems for law enforcement agencies. In March 1998, MDA was selected by the Canadian Space Agency to design, build and operate RADARSAT 2, the world's most advanced synthetic aperture radar Earth observation satellite.

In July 1998, MDA negotiated the acquisition of BC OnLine, British Columbia's online information utility. BC OnLine, and the addition of value-added consumer products available at KeyInfoBC.com are helping to grow MDA's activities in the domestic online information services sector. New initiatives scheduled to go live in 2000 will position MDA and its subsidiaries as North America's leading provider of online land-information and geographic products.

MDA's growth has been further fuelled in 1999 with the acquisition of the Space Robotics division of Spar Aerospace, in Brampton, Ontario and of RADARSAT International, of Richmond. MacDonald Dettwiler Space and Advanced Robotics (MD Robotics) is the world's leading provider of robotics for the manned space program, in the form of the Canadarm, used on all Space Shuttle missions, and the Mobile Servicing System (MSS) being deployed to construct and maintain the International Space Station.

III

Growth Trends In British Columbia's High-Tech Sector

High-tech is one of the fastest growing sectors in BC's economy[1]. This sector employed just over 46,000 people in 1998, representing a 47% increase from five years earlier and a growth rate of more than four times the provincial average.

Leading international forecasts predict continuing global growth in the high-tech sector, including key sub-sectors in which British Columbia currently has a strong niche position—information technology, wireless telecommunication, and biotechnology. Given this picture, BC's high-tech sector is expected to experience continuing growth in the years to come. If recent historical trends continue, British Columbia's high-tech sector could provide 70,000 direct jobs by 2005—an increase of 24,000 additional jobs.

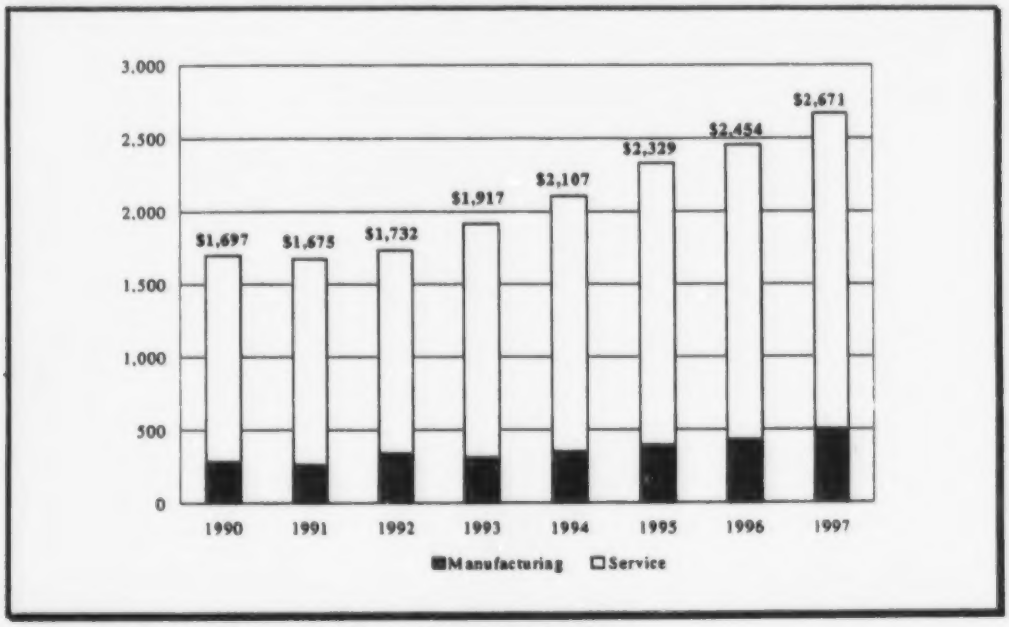
[1] *Data used in this section have been provided by BC Stats.*

A. High-technology growth in BC

1. Growth in gross domestic product (GDP)

In the period from 1990 to 1997, BC's high-tech sector GDP (in constant dollars) increased at an annual rate of 6.7%, outpacing total provincial GDP growth which averaged 2.5% per annum. Exhibit III-1 illustrates high-tech sector GDP growth.

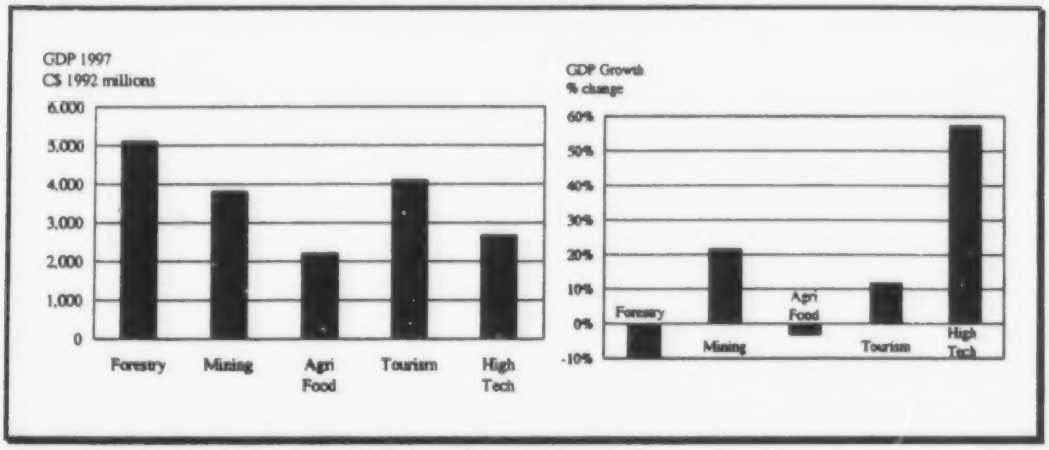
Exhibit III-1
High-tech sector GDP in BC, 1990-1997 (1992 constant C$ millions)



Source: Profile of the BC High-technology sector 1999, *Detailed Table 1.*

In less than a decade, high-tech has become an important new growth engine for BC. Its economic contribution is increasing relative to the province's established export sectors: forest products, mining and primary metals, agri-food, and tourism. Among these sectors, high-tech ranked fourth in terms of GDP in 1997, and first in GDP-growth over the period 1990-97, as illustrated in Exhibit III-2.

Exhibit III-2
High-tech sector comparative GDP and growth, 1990-97



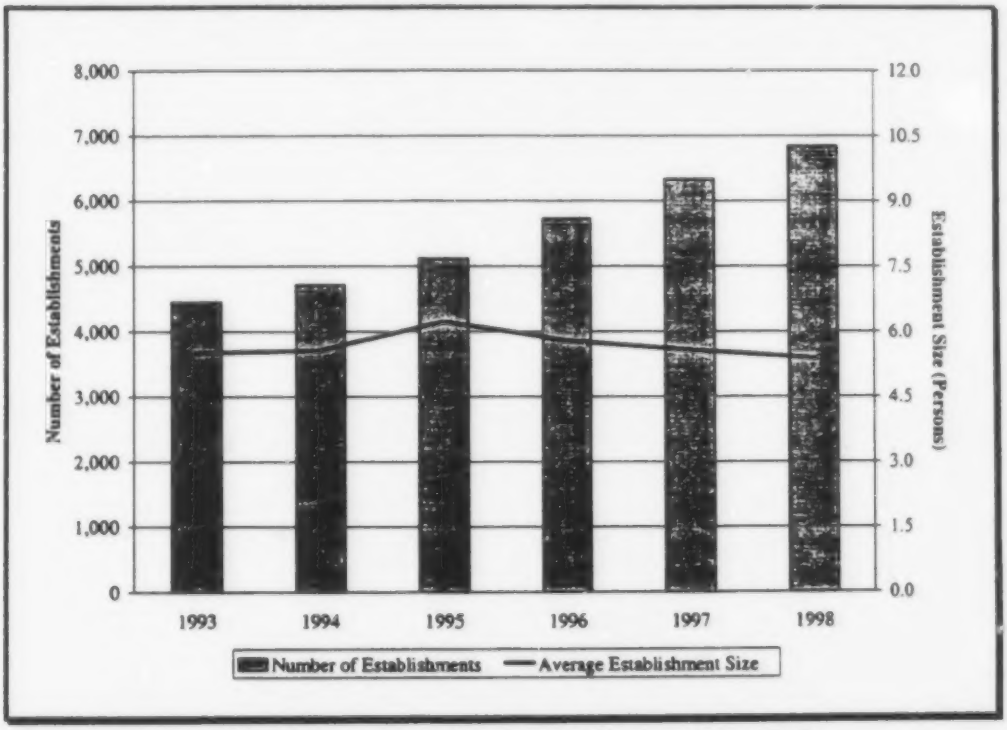
Source: Profile of the BC High-technology sector 1999, *Detailed Table 3.*

2. Growth in number of firms

Exhibit III-3 illustrates the growth in high-tech firms operating in British Columbia between 1993 and 1998. In this five year period, the number of high-tech establishments has increased by 54%, from 4,448 to 6,843.

While the number of firms has grown significantly over this period, Exhibit III-3 also illustrates that the average firm size has not changed significantly during this period, varying in a range of approximately 5.5 to 6.0 persons per establishment. While the number of large technology companies operating in BC has grown over this period, this growth has been balanced by significant growth in small, entrepreneurial firms.

Exhibit III-3
Number and size of BC high-tech establishments, 1993-1998



Source: Profile of the BC High-technology sector 1999, *Detailed Tables 6 and 10 and KPMG.*

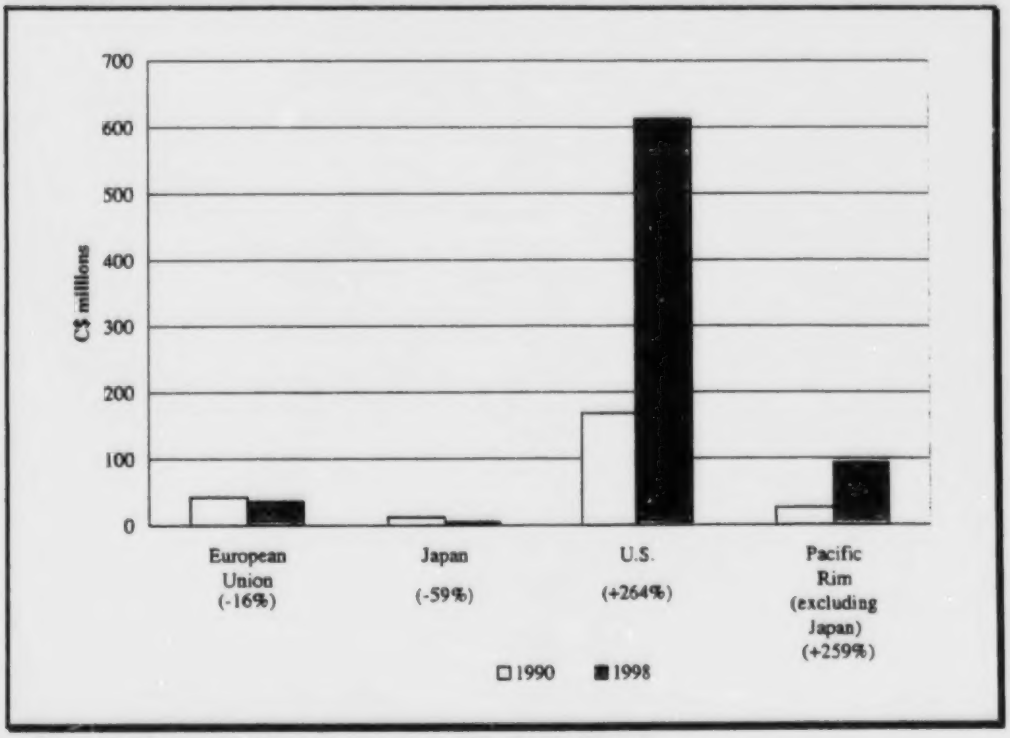
3. Growth in exports

Since the domestic market for high-tech goods and services is relatively small, BC-based companies typically must look to external markets to support sustained growth. Approximately 39% of total high-tech product shipments in 1998 were exported internationally. The value of BC high-tech product exports grew by 184% between 1990 and 1998. Exhibit III-4 illustrates export values by market and growth trends of exports. The US is by far the largest market for BC high-tech products, receiving 80% of all exports, followed by the Pacific Rim countries (13%), and the European Union (5%). The information presented represents the changes in exported values over an eight-year time frame.

These figures do not include the export of services, a growing source of export earnings. In 1996, for every dollar earned in BC from export of high-tech products, an additional 75 cents was earned from the export of BC high-tech services.

The eight-year trend also indicates a shift in countries of export. While exports to the European Union and Japan have actually declined, exports to the United States and Pacific Rim countries (excluding Japan) have increased dramatically.

Exhibit III-4
BC high-tech product export values by market, and growth, 1990-98



Source: Profile of the BC High-technology sector 1999, *Detailed Table 16.*

The performance of BC's high-tech companies in the global marketplace is underpinned by two factors:

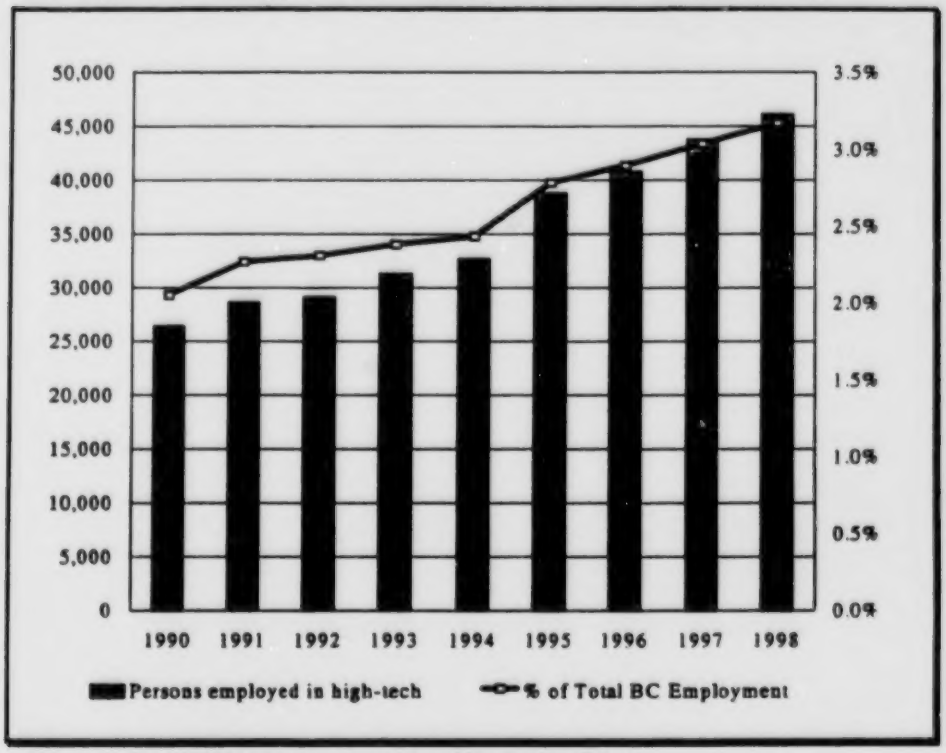
- **Business behaviour**—characterized by a sustained focus on niche-technologies and markets, commitment to R&D, and effective use of strategic alliances and joint ventures.
- **Business environment**—including favourable tax treatment for small manufacturers and firms engaged in research and development, strong industry-institutional collaboration, and high-quality talent.

4. Growth in employment

a) Growth within BC

Between 1990 and 1998, high-tech sector employment grew by 75%, from approximately 26,000 to over 46,000, with growth in the high-tech sector outpacing the provincial economy. As seen in Exhibit III-5, over this period, high-tech employment grew from 2.1% of total BC employment to 3.2%.

Exhibit III-5
BC high-technology sector employment, 1990-98 (persons)



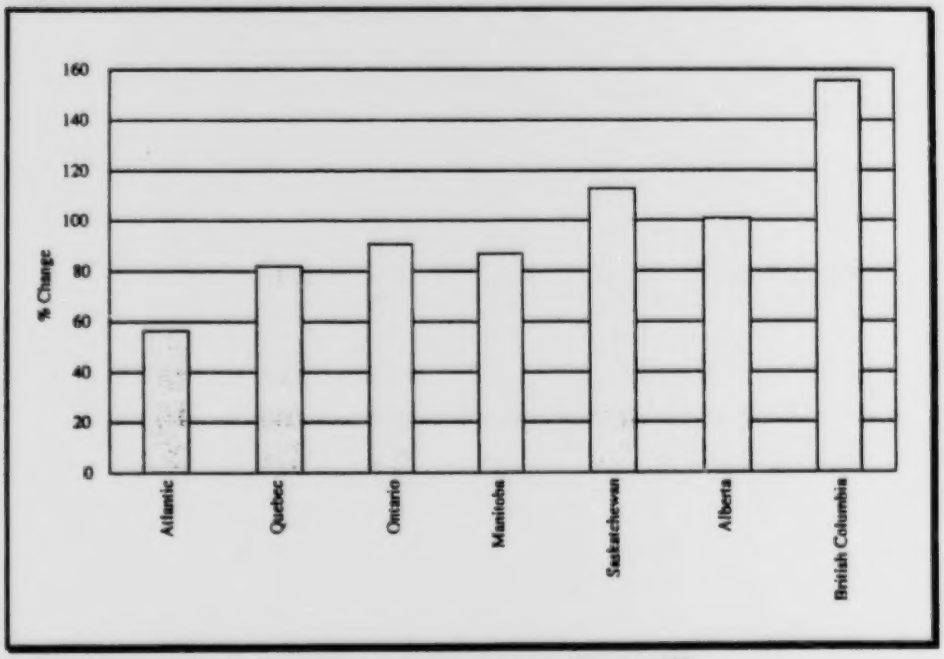
Source: Profile of the BC High-technology sector 1999, *Detailed Table 1.*

b) Comparative growth indicators – BC and Canada

As illustrated in Exhibit III-1, services represent the largest component of the high-tech sector in British Columbia. Much of the employment growth in the province has been for computer professionals, notably computer programmers and systems analysts.

While demand for these computer professionals has also grown rapidly in other parts of Canada, Exhibit III-6 shows that between the period of 1992 and 1997, BC outpaced all other regions in Canada in the creation of new programming and systems analyst jobs.

Exhibit III-6
Regional employment growth of computer programmers and systems analysts, 1992-97



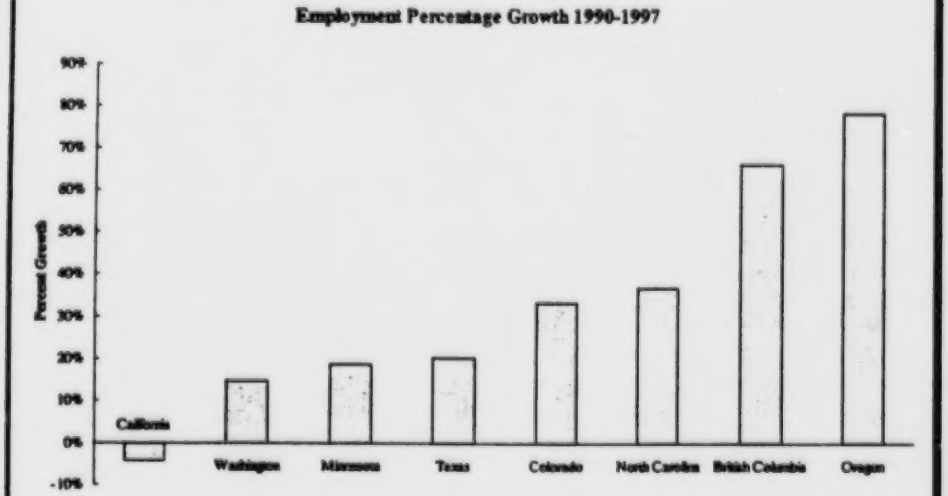
Source: Statistics Canada, Perspectives on Labour and Income, Summer 1998.

c) Comparative growth trends– BC and US jurisdictions

The BC Ministry of Employment and Investment (MEI) has performed an analysis of employment levels in the high-technology industry sectors, between 1990 and 1996, for British Columbia and seven US jurisdictions. The results of the analysis are presented in Exhibit III-7.

Exhibit III-7
High-tech employment in British Columbia and US jurisdictions

	All Hi Tech Industries		
	Number of People Employed		Percent Change
	1990	1997	1990-1997
California	837,795	802,898	-4%
Washington	171,022	196,237	15%
Minnesota	82,279	97,678	19%
Texas	321,090	386,261	20%
Colorado	88,798	118,413	33%
North Carolina	80,234	109,729	37%
British Columbia	26,370	43,820	66%
Oregon	38,573	68,775	78%



Source: Analysis of BC Stats and US Bureau of Labour Statistics data by BC Ministry of Employment and Investment. Data for the US have been compiled to achieve the closest possible match with the definition of high-tech employment used for British Columbia.

Note: As a result of a decrease in the aerospace industry from the years 1990 to 1996, the states of California, Texas and Washington may show a hi tech employment growth rate less than expected due to the significance of the aerospace industry in those states.

MEI's findings are summarized as follows:

- In absolute terms, the high-tech industry in British Columbia is not as large as in the more populous US jurisdictions.
- In British Columbia, high-tech employment grew by 55% between 1990 and 1996, from 26,370 to 40,820.
- On a percentage basis, British Columbia's six-year increase in high-tech employment was second highest among the jurisdictions examined.

B. BC's high-tech future – potential and opportunities

The growth of BC's high-tech sector is particularly impressive, given that it received little initial stimulus from defence-related spending, lacked significant local markets, and, until recently, consisted almost entirely of small-scale "home-grown" enterprises.

Progress has now been made in developing competitive industrial clusters to help the BC high-tech sector develop a critical mass and to become a global player in high-tech. Indeed, future prospects for the BC high-tech sector appear to be promising, based on the brief examination of future demand growth and major global trends set out below.

1. Future growth in product demand

Global markets for high-tech goods and services are expected to continue expanding at a rapid pace, as these sample forecasts for the US indicate[1]:

- The US market for **computer equipment** is forecast to grow by approximately 13% per annum over the next three years, with the US market purchasing a total of US $227 billion of computer equipment in 2002.
- Demand for **computer services** is also expected to continue to grow rapidly. Until 2002, the market for professional computer services in the US is expected to grow by approximately 16% per annum, to represent a US $197 billion market in 2002.

[1] *Source:* US Industry and Trade Outlook 1998, *US Department of Commerce*

- For **networking technologies**, it has been estimated that by the year 2000, 78% of business PC's in the world will be networked, up from 56% in 1995. Over the same period, this trend towards greater connectivity is expected to translate into an 11% average annual increase in global revenues for local-area networking technologies.

- The **telecommunications equipment** sector is forecast to continue growing over the period to 2002, although growth will slow to an average rate of 5% per annum by the end of this period. One of the leading growth areas over this period is expected to be wireless communication and wireless networking products—an area of focus in the BC high-tech industry.

- The US market for **health therapeutics and human diagnostic products** is growing rapidly, and this market is projected to reach C$16.6 billion in 2001 and C$29.6 billion in 2006. The time required for new products to obtain regulatory approval in the US has been falling sharply, which should provide further impetus to research investment and new product development in the industry.

British Columbia's high-tech industries have strong positions in a number of these key growth sectors, including information technology, wireless telecommunication and biotechnology. Given BC's cost competitiveness with other jurisdictions, as illustrated later in this report, BC firms should be well positioned to capture a share of this growing demand.

2. Global trends affecting the high-tech industry

BC's high-tech sector is also well-positioned to take advantage of the global opportunities that are being driven by fundamental technological and market trends. A detailed analysis of these trends is beyond the scope of this report, but some broad themes are highlighted below.

a) Growing trade-liberalization, deregulation and privatization

BC is a relatively small economy that has traditionally depended on access to global markets. This dependence will continue as BC's economy shifts towards the production of knowledge-based goods and services. The potential enlargement of NAFTA to include some of Latin America's most dynamic economies would open up major new opportunities. Deregulation and privatization of telecommunications and aviation are also creating opportunities in industries that are of particular interest to BC firms.

b) Rapid growth rates in emerging economies

New investments in modern manufacturing facilities and infrastructure expected to occur in the world's emerging economies should provide unprecedented long term-opportunities for BC's engineering and industrial-equipment firms. While questions surround the economic performance of many Asian and Latin American economies in the near to medium-term, BC's location on North America's Pacific Rim means the province is well positioned to serve both these regions.

c) Falling computing and telecommunication costs

The price-performance ratio of microprocessors continues to grow exponentially. This trend has stimulated a massive increase in use of technology, and rapid growth in the electronics equipment industries. This trend of improving price-performance ratios is expected to continue.

Ongoing growth in the computer equipment market is expected to come from ever-improving technologies. Silicon-based technology is expected to reach its limits early in the next century, but current research into optoelectronic and biomolecular computing is already expected to give rise to the next generation of computing technologies during the first years of the new millennium.

Telecommunication costs have also been falling rapidly as a result of deregulation and technological change. Continuing growth of wireless communications is expected to generate further opportunities for BC firms in this field.

3. Conclusion

Based on this brief examination of the key high-tech sectors in which future product demand growth is expected to occur, and some major global trends affecting the entire high-tech industry, the BC high-tech sector appears well positioned to capitalize on these changes, and to continue its strong pattern of growth.

IV

Comparative Costs in British Columbia

British Columbia offers a cost effective business environment for high-technology firms, with significant business cost advantages relative to major European and US high-tech centres. This chapter clearly demonstrates this advantage, by comparing key location-sensitive business costs in four high-tech industry sectors – electronics manufacturing (electronics), telecommunication equipment manufacturing (telecoms), packaged software, and advanced software.

Data on business costs in each of these four sectors have been sourced from a major KPMG study, *The Competitive Alternatives: A Comparison of Business Costs in North America, Europe and Japan*[1]. The four sectors represented in this study were chosen because they represent all of the technology-related sectors examined in *The Competitive Alternatives*.

A. Canada in context – international business costs

This section provides an international context, comparing costs in Canada with seven other countries, while the next section focuses in on business costs in British Columbia and select US high-tech centres.

In all four of the high-tech industry sectors examined, Canada represented the most cost-effective location among the eight countries included in KPMG's major international study, *The Competitive Alternatives*. As illustrated in Exhibit IV-1, average costs in Canada for the four high-tech sectors examined were found to be 8.9% below the US average (index of 100.0[2]). Costs in Canada were also found to be lower than in each of the other countries examined.

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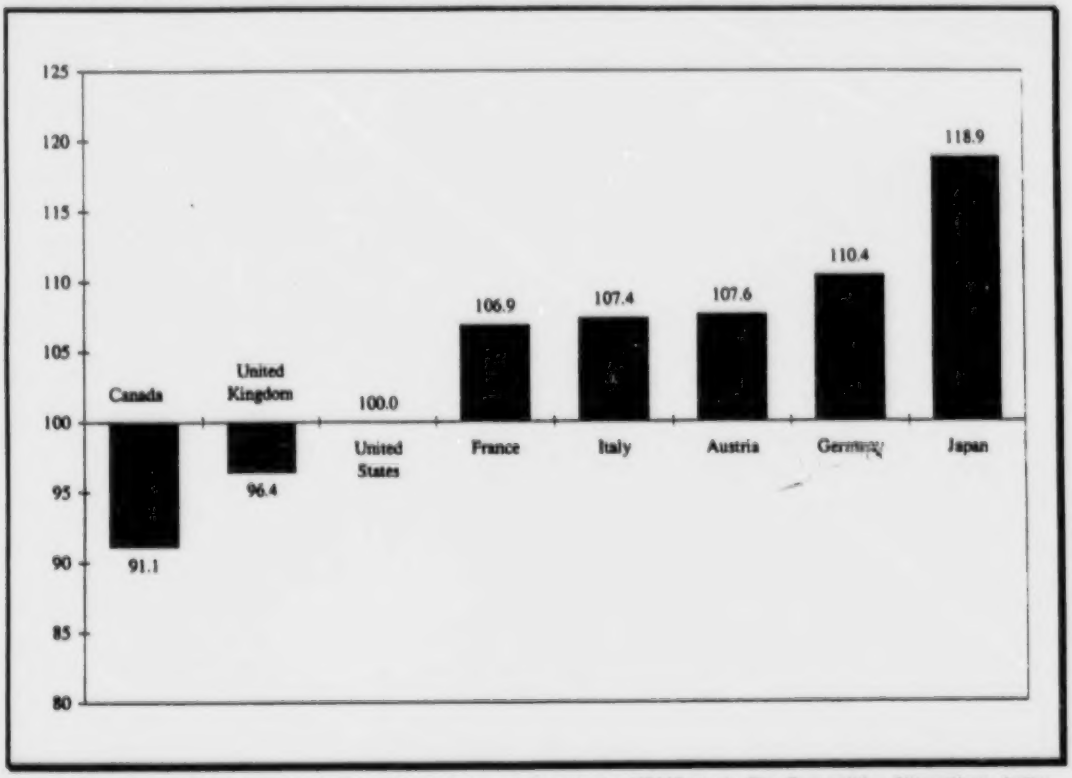
[1] *KPMG, March 1999. All statistics quoted in this chapter are related to business costs as at July, 1998 with an exchange rate of US$1.00=CDN$1.50.*

[2] *The index of 100.0 represents the US Average, as defined in the KPMG study,* The Competitive Alternatives. *For further detail on this index, industry operating parameters, or any other assumptions or methodology underlying this analysis, refer to that study.*

Exhibit IV-1
Index of total business costs, average of four high-tech industry sectors



Note: The index of 100.0 represents the US Average, as defined in the KPMG study, The Competitive Alternatives. *Index numbers below 100.0 represent total costs below the US Average.*

B. Business costs in BC and key US high-tech centres

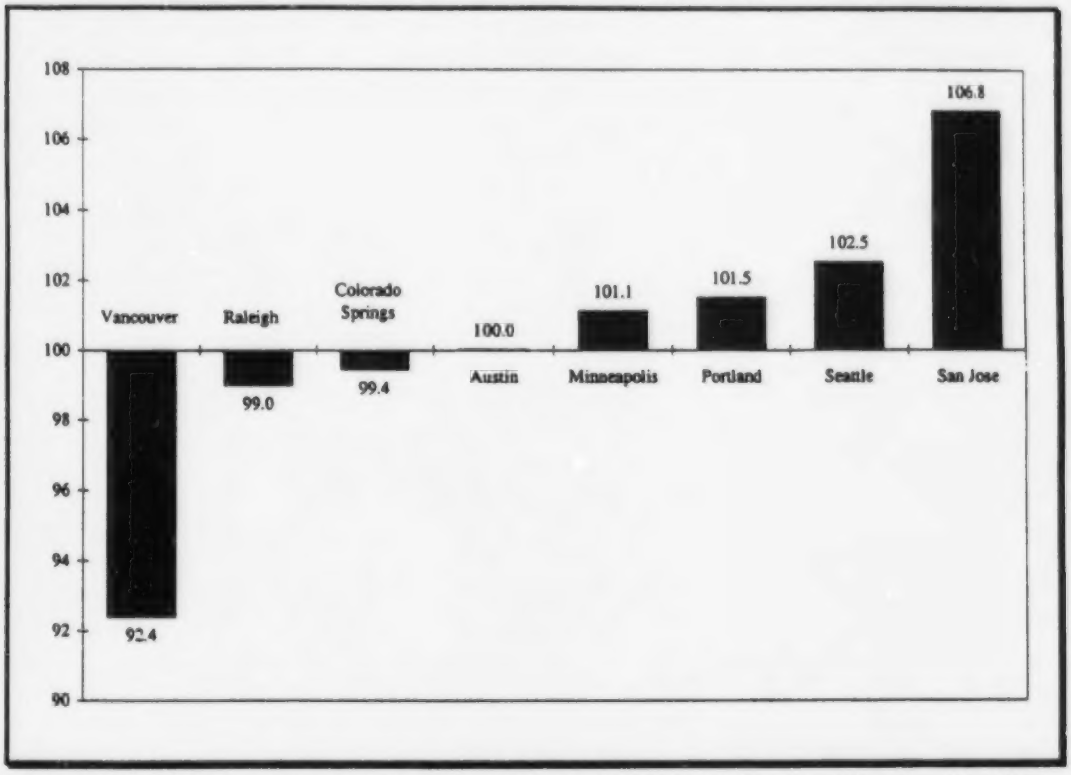
This section presents a comparison of business operating costs between Vancouver, the main hub for high-tech firms in British Columbia, and selected US cities, all of which are major centres for high-tech activity. The US cities included in this analysis are Austin TX, Colorado Springs CO, Minneapolis MN, Portland OR, Raleigh NC, San Jose CA, and Seattle WA. Data for four of these cities, Colorado Springs, Minneapolis, Raleigh and Seattle, were sourced from KPMG's major international study, *The Competitive Alternatives*. For the three additional US cities, comparable data were developed using the same methodology as for *The Competitive Alternatives*.

The comparative cost analysis was conducted by examining the investment and operating costs of establishing a manufacturing facility in Vancouver, as compared to each of the seven cities in the United States. The analysis was based on establishing a facility on a five-to-ten acre site in a suburban area zoned for light-to-medium industrial purposes. The two high-technology service sectors developing packaged software, and advanced or more customized software, are assumed to lease space in a Class A suburban office building for their operations.

Using standard accounting assumptions, the comparative cost model generated 10-year pro-forma financial statements, including balance sheets and income statements, treating each business as a stand-alone operation. The location-sensitive costs examined in this analysis include land, construction, office space, leasing (packaged software and advanced software only), labour costs (including benefits), electricity, telecommunications and taxes.

Business costs in Vancouver are consistently below the US average (index of 100.0) for all of the four high-tech industries examined. Based on the four high-tech industries examined, as illustrated in Exhibit IV-2, after-tax costs are significantly lower than in any of the seven US cities examined. Vancouver after-tax business cost advantage ranges from about 6% over Raleigh, North Carolina, to more than 15% over San Jose, California. Vancouver's after-tax business cost advantage over Seattle, the nearest US high-tech centre, is about 10%.

Exhibit IV-2
Index of total business costs, average of four high-tech industry sectors



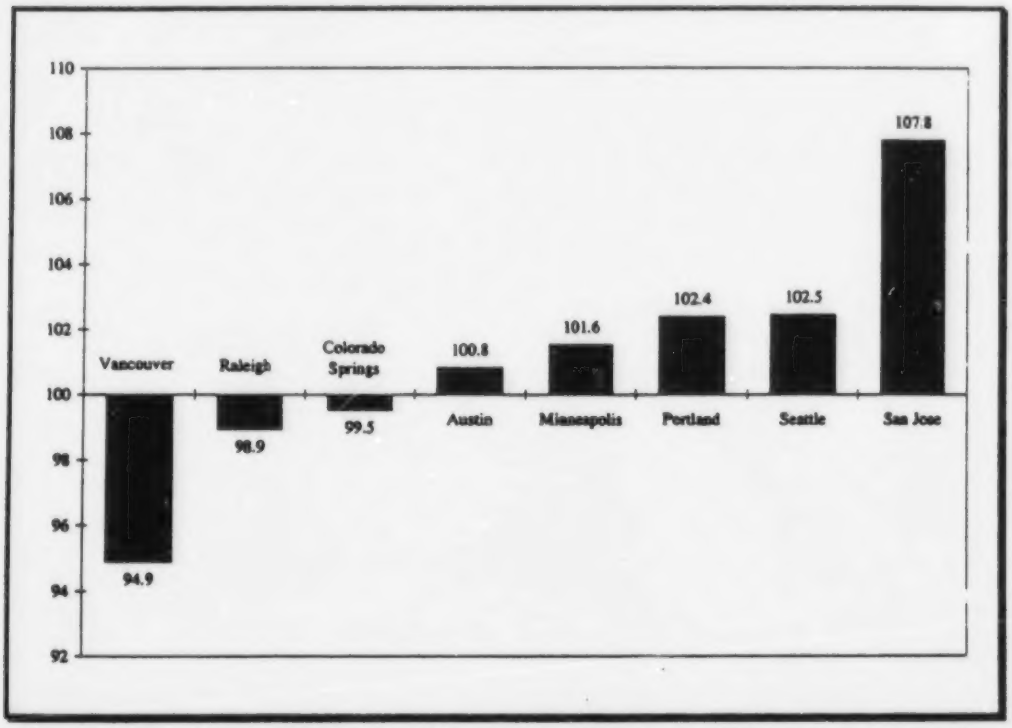
Note: The index of 100.0 represents the US Average, as defined in the KPMG study, The Competitive Alternatives. *Index numbers below 100.0 represent total costs below the US Average.*

Results for each of the four individual sectors examined are set out in the following sections.

1. Electronics industry

As illustrated in Exhibit IV-3, for the electronics industry total business costs were found to be lowest in Vancouver, followed by both Raleigh and Colorado Springs. Costs in Austin, Minneapolis, Portland, Seattle, and San Jose were all found to be above the US average, with costs in San Jose being significantly higher than in any of the other cities examined.

Exhibit IV-3
Index of total business costs, electronics manufacturing industry



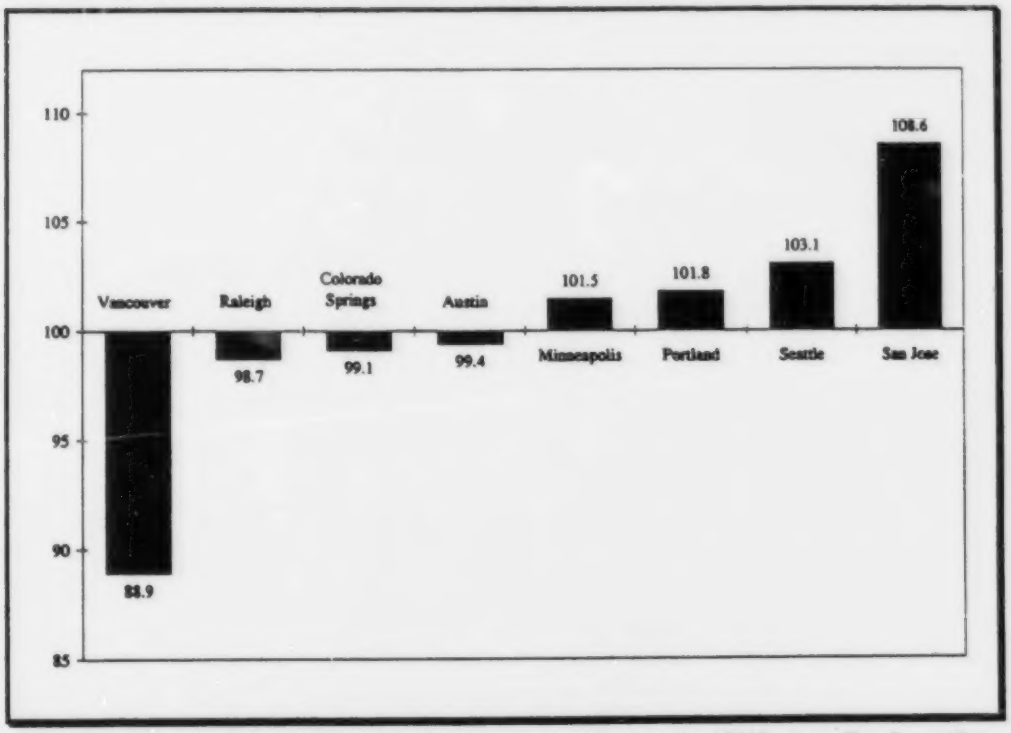
Note: The index of 100.0 represents the US Average, as defined in the KPMG study, The Competitive Alternatives. *Index numbers below 100.0 represent total costs below the US Average.*

2. Packaged software and advanced software

Exhibits IV-4 and IV-5 illustrate a very favourable cost position for Vancouver for package software and advanced software. While these two modelled operations are similar to a significant degree, the advanced software production operation is assumed to have more senior development staff for custom development.

For packaged software, total business costs were found to be lowest in Vancouver, followed in order by Raleigh, Colorado Springs and Austin. The relative advantage of Vancouver over the second-ranked city is greater in this industry sector than in the three other sectors examined.

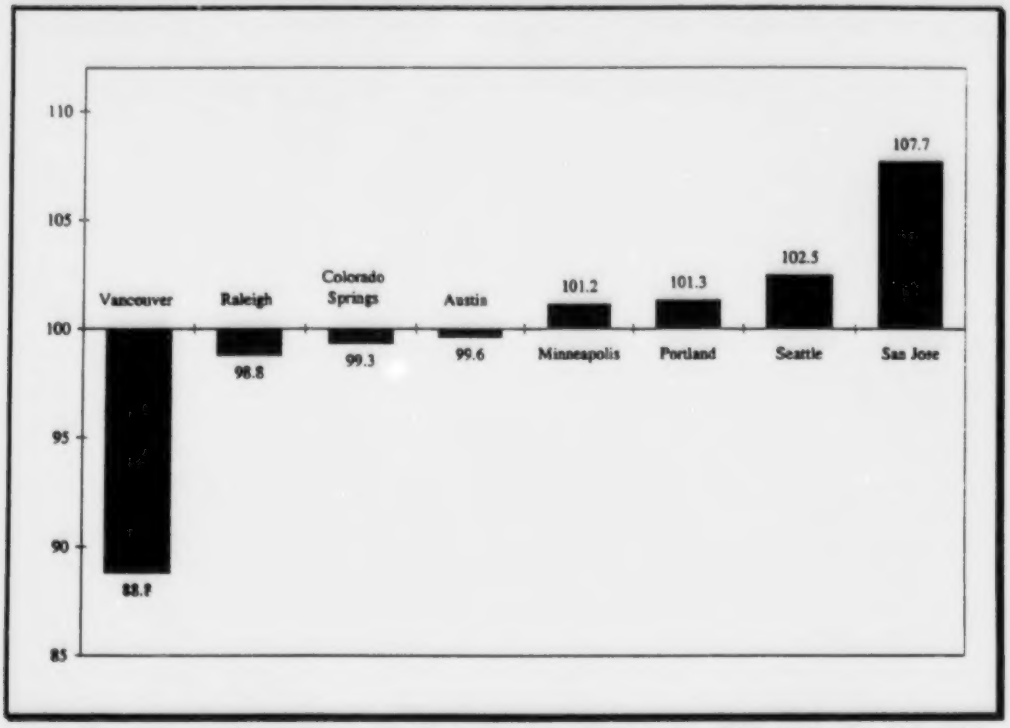
Exhibit IV-4
Index of total business costs, packaged software industry



Note: The index of 100.0 represents the US Average, as defined in the KPMG study, The Competitive Alternatives. *Index numbers below 100.0 represent total costs below the US Average.*

For the advanced software industry total business costs are lowest in Vancouver, followed in order by Raleigh, Colorado Springs and Austin. The relative advantage of Vancouver over the second-ranked city is similar to the packaged software industry.

Exhibit IV-5
Index of total business costs, advanced software industry

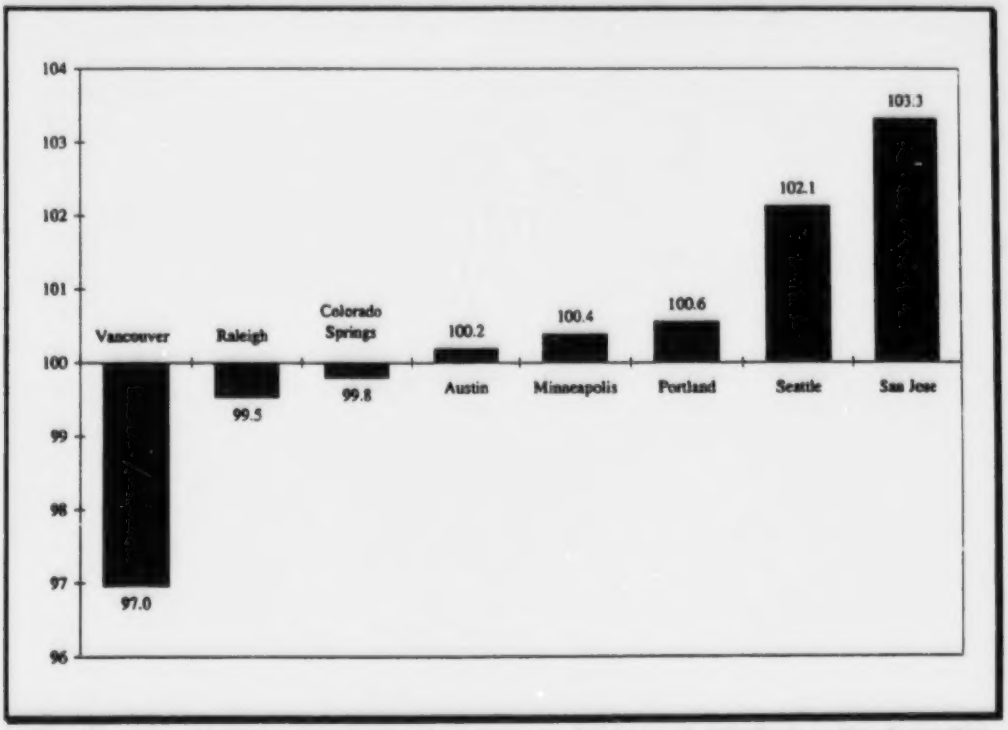


Note: The index of 100.0 represents the US Average, as defined in the KPMG study, The Competitive Alternatives. *Index numbers below 100.0 represent total costs below the US Average.*

3. Telecommunication equipment manufacturing industry

As illustrated in Exhibit IV-6, for the telecoms industry, total business costs are lowest in Vancouver, followed by Raleigh and Colorado Springs. Seattle and San Jose have the highest costs.

Exhibit IV-6
Index of total business costs, telecommunication equipment industry



Note: The index of 100.0 represents the US Average, as defined in the KPMG study, The Competitive Alternatives. *Index numbers below 100.0 represent total costs below the US Average.*

C. Differences in business costs

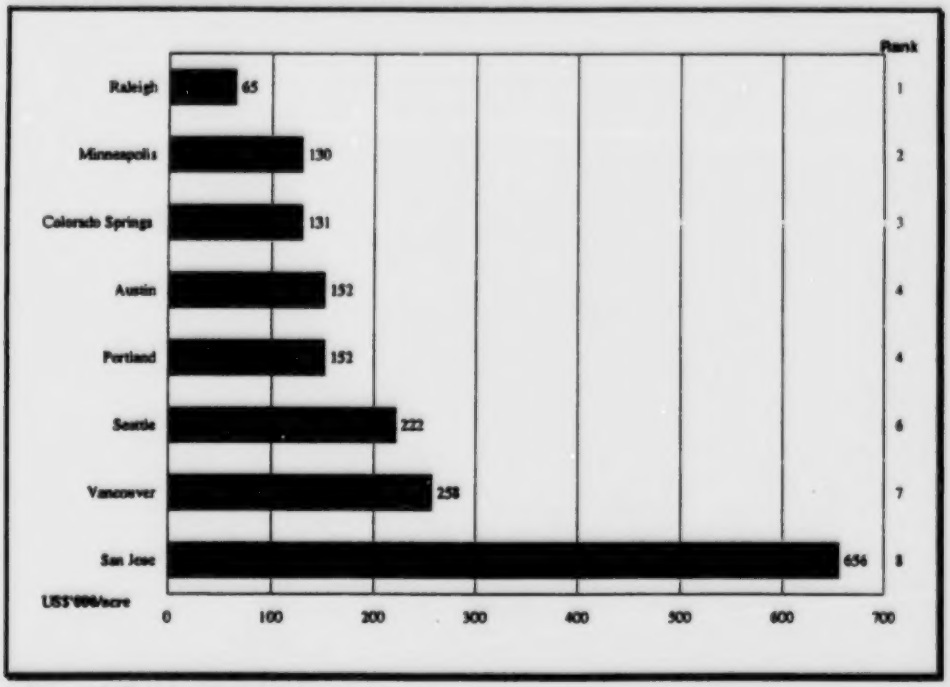
1. Location-sensitive investment costs

Industrial land costs and industrial facility construction costs were the two location-sensitive elements examined as part of initial facility investment costs. Other facility investment costs, such as the purchase of equipment, tend to vary much less among locations, and have been treated as non-location-sensitive in this analysis.

a) Industrial land costs

Land prices in British Columbia and the West Coast US states are generally higher than the national averages for Canada and the US respectively. Correspondingly, land costs in Vancouver are higher than in most of the US cities examined. As Exhibit IV-7 illustrates, industrial land costs in Vancouver are slightly higher than in Seattle, but are significantly lower than in San Jose. At US $656,000 per acre, industrial land prices in San Jose are among the highest in the United States.

Exhibit IV-7
Industrial land prices, US$'000 per acre

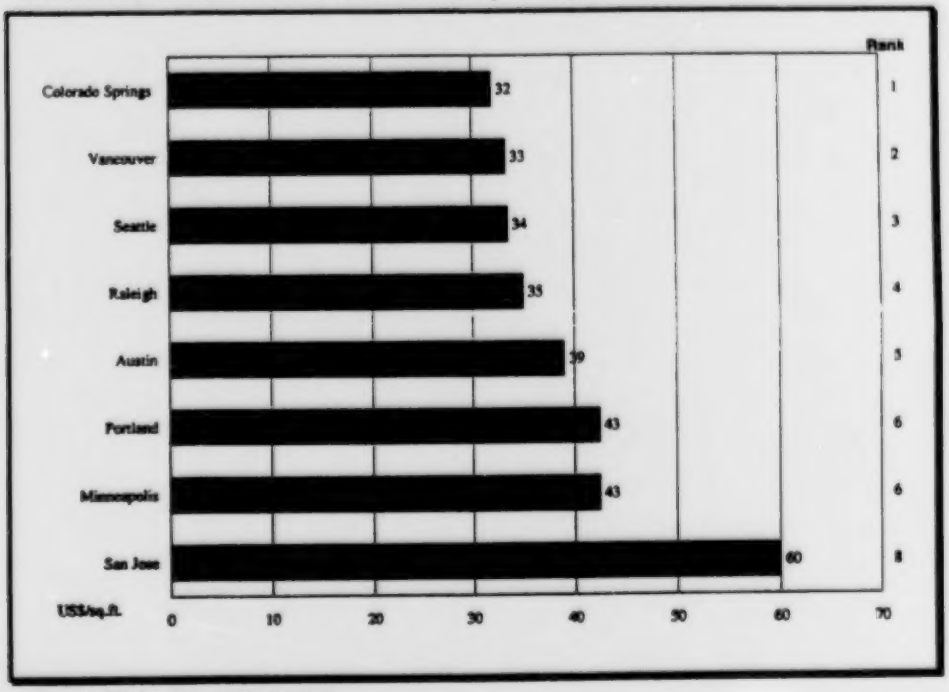


Source: Colliers International survey.

b) Industrial facility construction costs

As illustrated in Exhibit IV-8, construction costs in Vancouver are lower than in six of the seven US cities examined. Colorado Springs costs are $32 per square foot compared to Vancouver's $33 per square foot. Costs in Vancouver are followed closely by both Seattle and Raleigh, with costs in each of the other four US cities being significantly higher. The highest costs are in San Jose, at US $60 per square foot.

Exhibit IV-8
Industrial construction costs, US$ per square foot



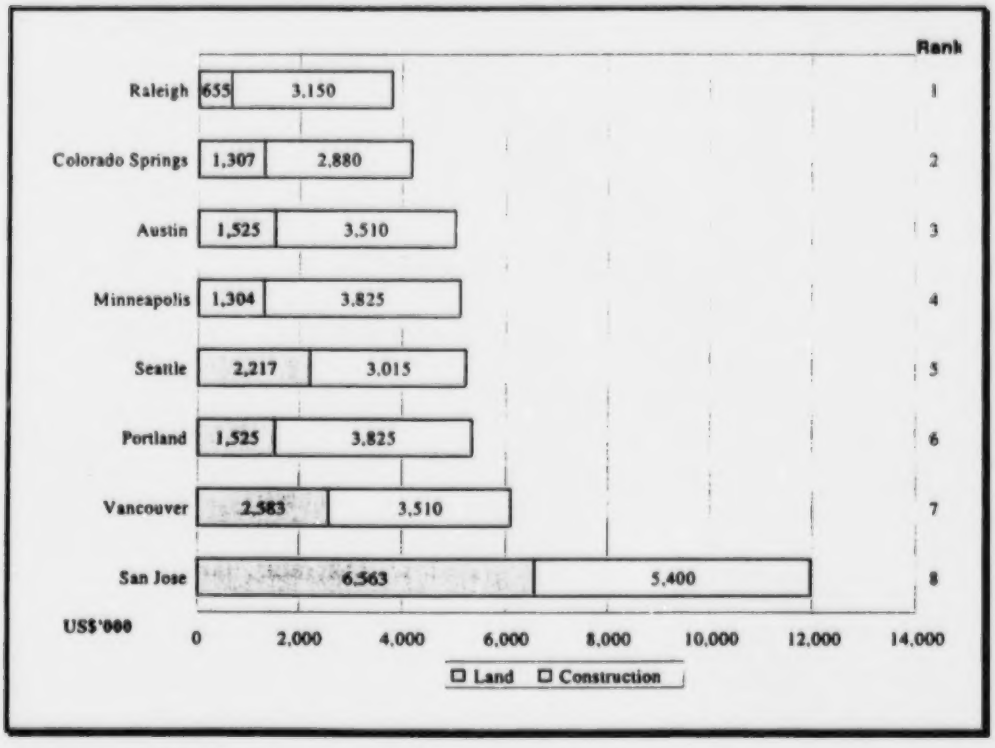
Source: Colliers International survey.

c) Combined initial facility investment costs

Exhibit IV-9 illustrates the combined impact of land and construction costs on the average initial facility investment costs for the electronics and telecommunications industries.

While Vancouver land costs are higher than in most other cities examined relatively, low construction costs help offset the higher land prices.

Exhibit IV-9
Initial facility investment costs, two sector average, US$'000



Note: Represents 10 acres of land and 90,000 square feet of building space.

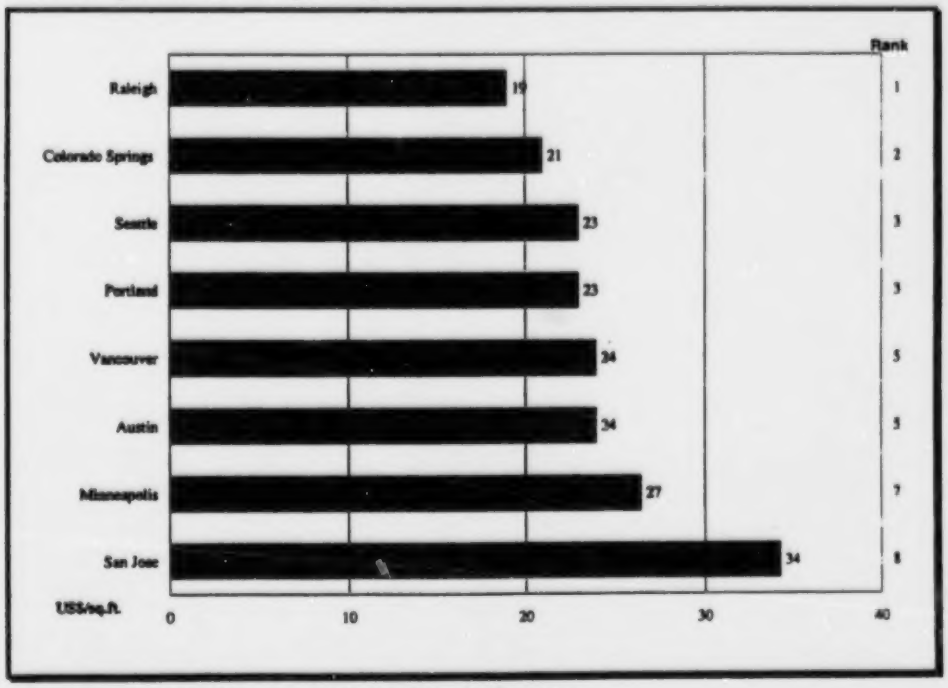
2. Ongoing annual costs

a) Office leasing costs

For software development firms, the analysis of lease costs focuses on the costs of leasing 22,500 square feet (2,090 square metres) of Class A office space located, where possible, in a suburban office park or campus setting. For some smaller centres, leasing of city centre office space is considered if no suitable suburban office space existed. The leasing data include all operating, utility, tax, and insurance costs generally passed on to the tenant in each location.

Exhibit IV-10 illustrates the range of leased office space costs. Raleigh has the lowest costs of the cities examined, followed by Colorado Springs and Seattle and Portland with equivalent costs. Vancouver and Austin have equivalent costs, followed closely by Minneapolis. San Jose has the highest leasing costs of the cities examined, at $34 per square foot.

Exhibit IV-10
Leasing costs, US$ per square foot



Note: Represents 22,500 square feet leased Class A office space.

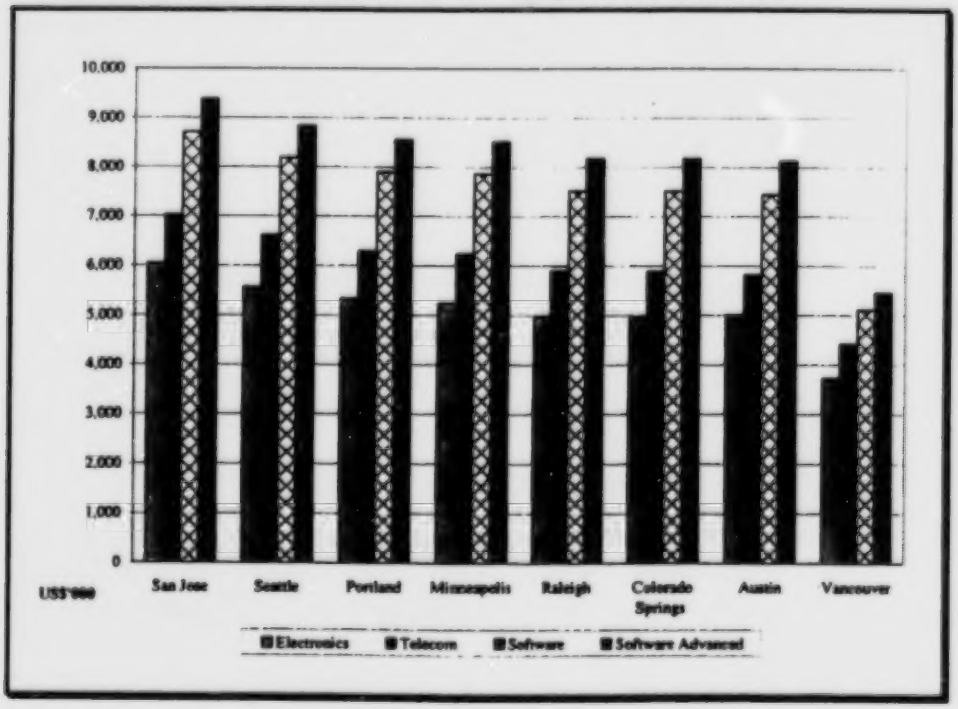
b) Labour costs

Labour costs represent the most significant location-sensitive operating cost, accounting for approximately 50% to 70% of total location-sensitive costs in each of the industries examined.

Total labour costs examined in this study include three components: salary and wages, statutory benefits (payroll-based taxes), and non-statutory employer-sponsored benefits.

As illustrated in Exhibit IV-11, Vancouver's total labour costs are consistently the lowest among the eight cities examined. The total labour costs illustrated in this exhibit are based on a labour force of 100 in electronics manufacturing, 120 in telecom equipment and 110 in each of the packaged software and advanced software industries. Austin, Colorado Springs and Raleigh rank after Vancouver in all four industry sectors.

Exhibit IV-11
Total annual labour costs, four industry sectors, US$'000



Vancouver's competitiveness in terms of labour costs results from a combination of three factors:

- Lower salary and wage costs than in each of the US cities examined.
- Lower costs associated with statutory benefits in British Columbia than in the US cities examined, principally due to the low cost of social security payments made in Canada (Canada Pension Plan) as compared the US (Federal Income Contribution Act).
- Lower costs associated with employer-paid benefits in British Columbia than in the US cities examined, principally due to lower hospital, surgical and medical insurance premiums in Canada than in the US. These insurance premiums represent an average cost to the employer of 8.7%[1] of gross payroll in the US, compared with 1.4%[2] in Canada. The lower cost in Canada is due to the fact that the Canadian health care system is publicly funded.

[1] Employee Benefits, The Hidden Payroll, *US Chamber of Commerce, 1997.*

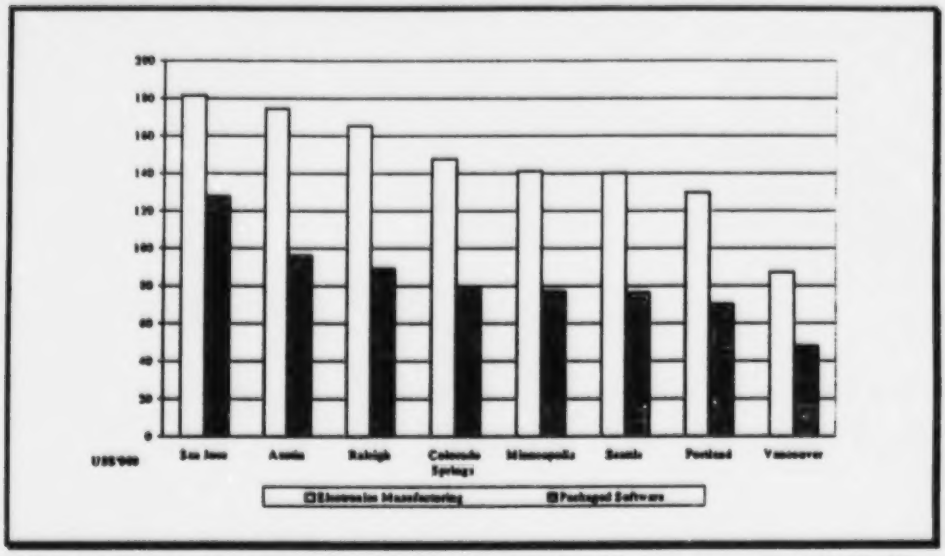
[2] Employee Benefits Cost Survey, *KPMG Consulting, 1998.*

c) Electricity costs

For medium and large industrial power users, the cost of electricity can become an important factor in the site selection decision. While electricity prices are not significant for all high-tech industries, they are critical in some cases. Exhibit IV-12 illustrates the annual electricity costs for low and medium industrial power users. Results for the electronics manufacturing and the packaged software industry are illustrated in the exhibit, and the results are also representative of the two other industries examined.

Vancouver has electricity costs that are substantially lower than in the US cities examined.

Exhibit IV-12
Annual electricity costs
Manufacturing and service sector averages, US$'000



Note: For electronics manufacturing the peak demand is 800 kVa and monthly consumption 225,000 kWh. For packaged software the peak demand is 450 kVa and monthly consumption 120,000 kWh.

d) Telecommunication costs

With rapidly increasing competition in the North American telecommunications industry, telecommunication prices are rapidly becoming standardized throughout the continent, and costs differ little among the eight cities examined. In general, current per-minute long distance rates in Canada are competitive with equivalent costs in the US.

e) Taxes

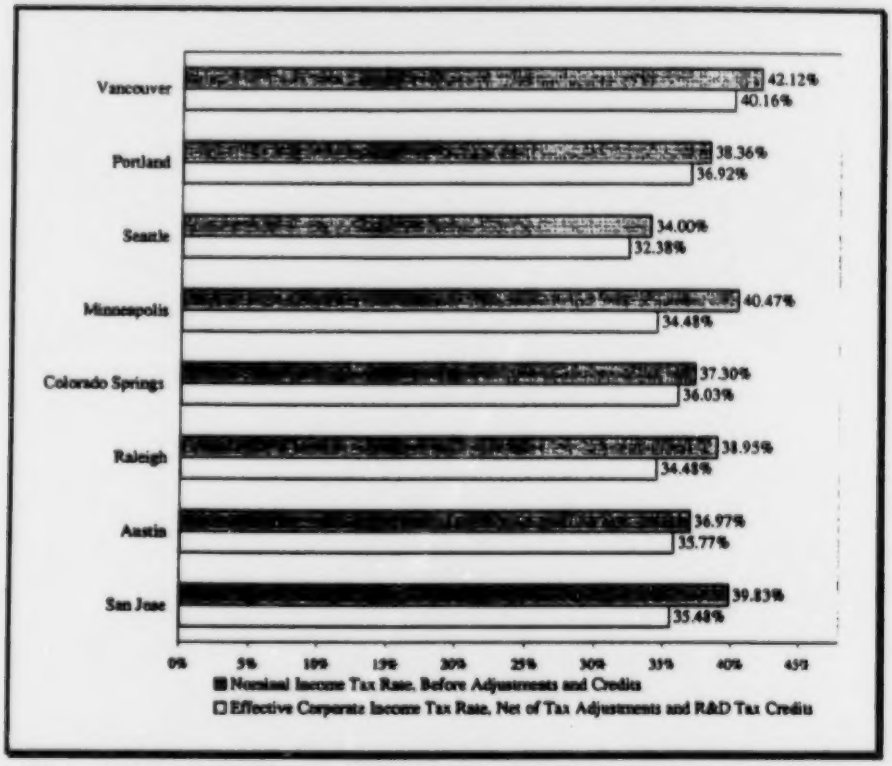
The overall comparison of business costs in this chapter includes the analysis of all significant corporate taxes, including income, capital, sales, property, and business taxes. The overall results illustrated earlier in Exhibits IV-1 to IV-6 have been calculated on an after-tax basis.

Results from the comparative cost study for the two most significant corporate taxation costs—income tax and property tax—are presented in this section. A more detailed discussion of all corporate taxes, as they apply in British Columbia, is contained in Appendices A to D of this report.

i) Corporate income tax

Exhibit IV-13 illustrates the nominal and effective income tax rates for each of the cities examined, based on the average of the four high-tech industry sectors studied (two manufacturing and two service sectors).

Exhibit IV-13
Nominal and effective corporate income tax rates for high-tech industries, four sector average, % of net profit before tax



Note: US nominal tax rates have been adjusted to reflect the deductibility of state income tax at the federal level.

Note: All R&D credits and tax adjustments are based on the detailed industry operating parameters developed for each of the electronics, telecoms, packaged software and advanced software development industries and detailed in The Competitive Alternatives.

Note: Washington State Business & Occupation Tax (gross receipts tax) has been included in the figure for effective tax rate for that state, as this tax applies in lieu of a state income tax.

Note: Analysis for Vancouver does not include a 10% R&D tax credit introduced by British Columbia in September, 1999.

Based on the average of the four high-tech operations examined, both the nominal income tax rate (before any credits or adjustments) and the effective income tax rate (after credits and adjustments) in British Columbia are slightly higher than in each of the US jurisdictions.

However, unlike in the US, Canadian corporate income tax rates vary significantly between manufacturing and non-manufacturing companies, due to specific federal tax reductions that apply to manufacturing and processing operations. The breakdown of income tax rates for BC by sector, presented in Exhibit IV-14, reveals that:

- The nominal and effective income tax rates in British Columbia for the two service operations examined are higher than in any of the US locations examined.
- However, the nominal and effective income tax rates in British Columbia for the two manufacturing operations examined rank competitively among the US locations examined.

Exhibit IV-14
British Columbia corporate income tax rates, by sector

	Manufacturing (electronics, telecom equip)	*Services (package and adv. software)*	*Average (per Exhibit IV-13)*
Nominal corporate income tax rate	38.62%	45.62%	42.12%
Effective corporate income tax rate	35.37%	44.94%	40.16%

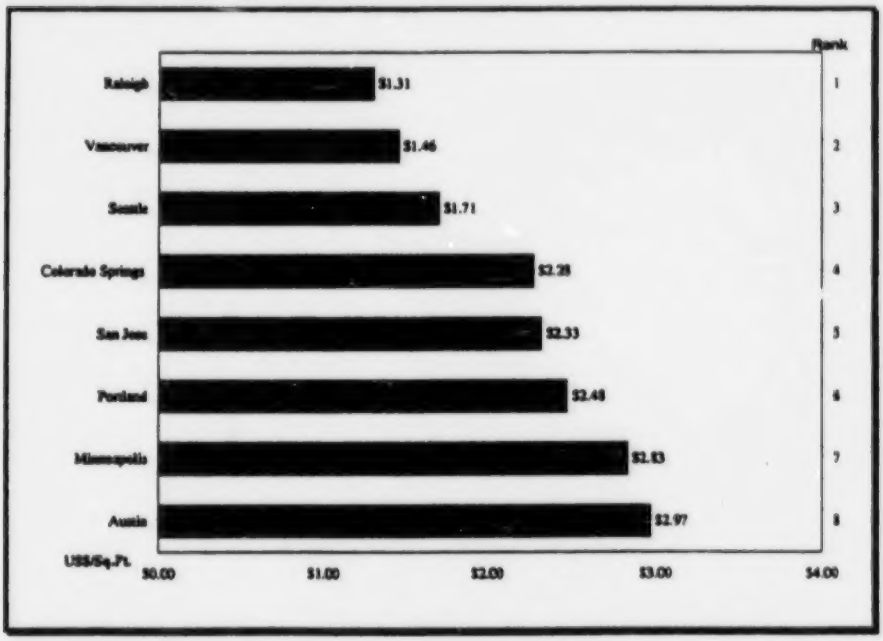
Regardless of effective tax rates, it should be noted that this study found higher total income taxes payable in Vancouver than in the US cities, due to lower operating costs and higher pre-tax profits in Vancouver. However, the additional income tax costs in Vancouver do not outweigh its operating cost savings, and on an after-tax basis, this study found that Vancouver offers lower total costs, and higher after-tax profits, than any of the US cities examined.

The results of this analysis incorporate the significant federal income tax credits and deductions available for research and development activities undertaken in Canada. However, the results do not incorporate the effect of a new British Columbia R&D tax credit introduced in September 1999 as it was introduced after this competitive analysis was undertaken. Further information on both the federal and British Columbia R&D tax credits can be found in Appendix B of this report.

ii) Property tax

Property tax tends to represent the second most significant element of most companies' total tax burden. As illustrated in Exhibit IV-15, property tax costs in Vancouver, expressed as a cost per square foot of building space, are second-lowest among the eight cities examined. One reason underlying the favourable property tax costs in Vancouver is that in British Columbia property taxes apply only to real property (land and buildings), rather than to all tangible property (including machinery and equipment), as is commonly the case in the US.

Exhibit IV-15
Relative property tax costs, two sector average, US$ per building square foot



3. Combined impact of business cost components

Exhibit IV-16 summarizes the overall results of this comparative cost study for each of the four industry sectors examined. In each of these sectors, Vancouver has the lowest overall business costs among the eight cities examined. Vancouver's greatest advantage is in the software industries, followed by the telecommunication equipment and electronics industries.

Exhibit IV-16
Index and ranking of total business costs, four industry sectors

	Electronics		Telecom		Packaged Software		Advanced Software	
	Overall Ranking	*Overall Index*	*Overall Ranking*	*Overall Index*	*Overall Ranking*	*Overall Index*	*Overall Ranking*	*Overall Index*
Vancouver	1	94.9	1	97.0	1	88.9	1	88.8
Raleigh	2	98.9	2	99.5	2	98.7	2	98.8
Colorado Springs	3	99.5	3	99.8	3	99.1	3	99.3
Austin	4	100.8	4	100.2	4	99.4	4	99.6
Minneapolis	5	101.6	5	100.4	5	101.5	5	101.2
Portland	6	102.4	6	100.6	6	101.8	6	101.3
Seattle	7	102.5	7	102.1	7	103.1	7	102.5
San Jose	8	107.8	8	103.3	8	108.6	8	107.7

Note: The index of 100.0 represents the US Average, as defined in the KPMG study, The Competitive Alternatives. *Index numbers below 100.0 represent total costs below the US Average.*

4. General nature of comparative results

Like any modelling analysis, a number of general and specific assumptions have been incorporated in the modelling of each operation, in each location. Refer to the major KPMG study, *The Competitive Alternatives,* for further business model assumptions.

While care has been taken in developing these findings, the results are necessarily of a general nature and should not be interpreted as a definitive opinion on the relative merits of locating a specific facility in any of the jurisdictions. Further analysis would be required, both for financial and non-financial factors, to determine the best site for any specific facility.

Information provided here should be used for guidance only, and may not be applicable in particular situations. Readers are strongly advised to seek professional advice in considering specific investment opportunities.

D. Personal cost-of-living and income taxes

One of the key issues facing the BC high-tech sector, in common with much of the global technology sector, is the challenge of recruiting and retaining top-quality employees. While British Columbia has a well-justified reputation as a highly desirable location in which to live, it also has a reputation as having high personal income taxes relative to US high-tech centres. This section examines this question of personal income tax costs, but also examines personal income tax costs in the perspective of overall cost of living.

To address this issue, KPMG commissioned Matthew Fischer and Associates, in cooperation with Runzheimer Canada Inc., to perform an analysis of the personal cost of living as of July 1998, for the eight cities examined by the KPMG business cost analysis. Runzheimer, a firm recognized as a world leader in assessing executive cost of living and relocation issues, provided all personal tax and cost of living data. Analysis and synthesis of the data was completed by Matthew Fischer and Associates, a London, Ontario, based consulting firm which had previously completed a number of similar analyses in cooperation with Runzheimer. The analysis includes an examination of:

- Personal income taxes, by jurisdiction and income level. As illustrated in Exhibits IV-17(a), IV-17(b), IV-17(c), personal income tax rates are significantly higher in BC than in the US jurisdictions surveyed.

  This analysis is limited to income tax on earned income, and does not include an analysis of the differences between Canadian and US tax treatment of capital gains on stock options.

- Costs of consumer goods and services, again by jurisdiction and income level. Vancouver's competitive position is much stronger with respect to the costs of consumer goods and services. Exhibits IV-17(a), (b), and (c) shows that Vancouver's personal costs of consumer goods and services are competitive with all the US centres surveyed, and are significantly lower in Vancouver than in some US centres.

The combined impact of these factors is illustrated in Exhibits IV-17(a), (b) and (c). These exhibits shows that:

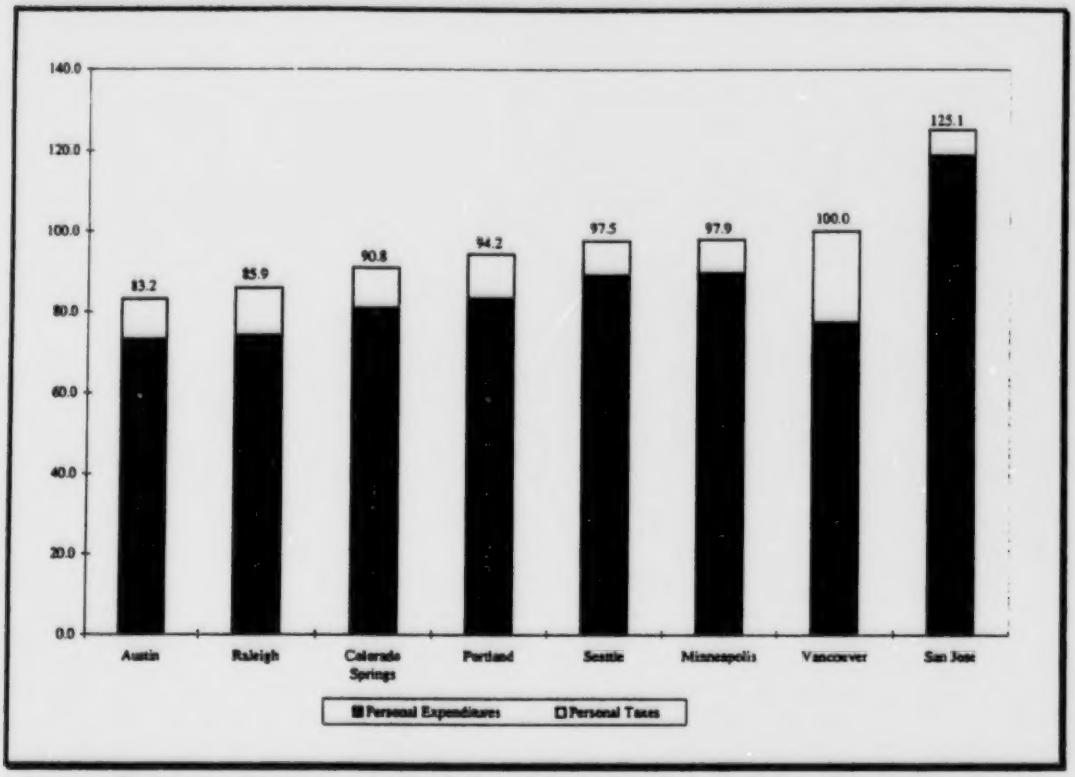
- At the $50,000 level, Vancouver is the least costly in terms of personal expenditures, although its personal tax level is the highest. Vancouver's combined total cost of living is second highest, about 24% lower than San Jose. Vancouver is at a 17% cost disadvantage to the lowest-cost US city, Austin, Texas.

- At the $100,000 income level, Vancouver is again least expensive in terms of personal expenditures, but most expensive in terms of income tax. Combining these two factors, Vancouver's total cost of living is nearly 30% less than for San Jose, not significantly different from Seattle, about 4% to 6% more expensive than Minneapolis and Portland, and about 15% to 20% more expensive than Colorado Springs, Raleigh and Austin.

- At the $225,000 income level, Vancouver's total cost of living is about 5% lower than for San Jose, but between 20% and 40% higher than for the other six cities.

With the exception of San Jose, high-technology employees tend to experience a higher personal cost of living in Vancouver than in competing US jurisdictions. However, at the $50,000 and $100,000 income levels, the total cost of living in Vancouver, including personal income taxes, is not materially different from Portland or Seattle, the two other Pacific Northwest cities examined in this analysis.

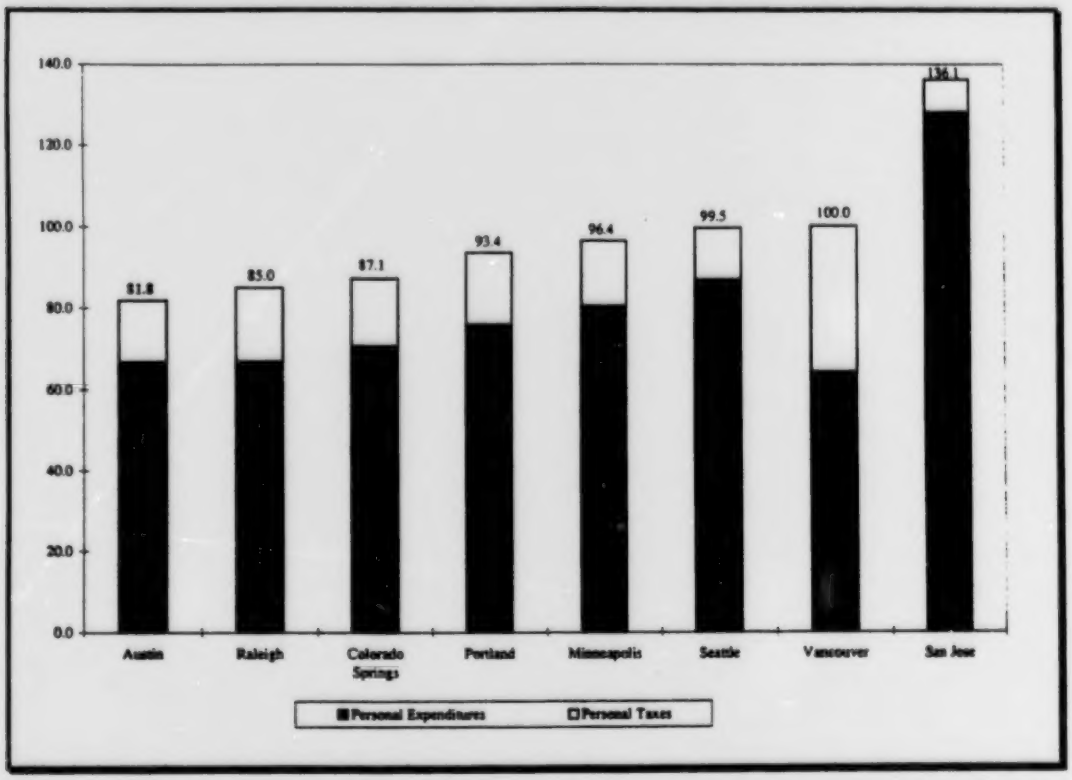
Exhibit IV-17(a)
Fischer/Runzheimer cost of living index, $50,000, Vancouver = 100.0



Source: A "Bottom-Line" Comparison of Living Costs in Selected Canadian and American Cities, Matthew Fischer & Associates, January, 1999.

Note: Analysis does not take into consideration British Columbia provincial tax cut of 2% beginning January 1999.

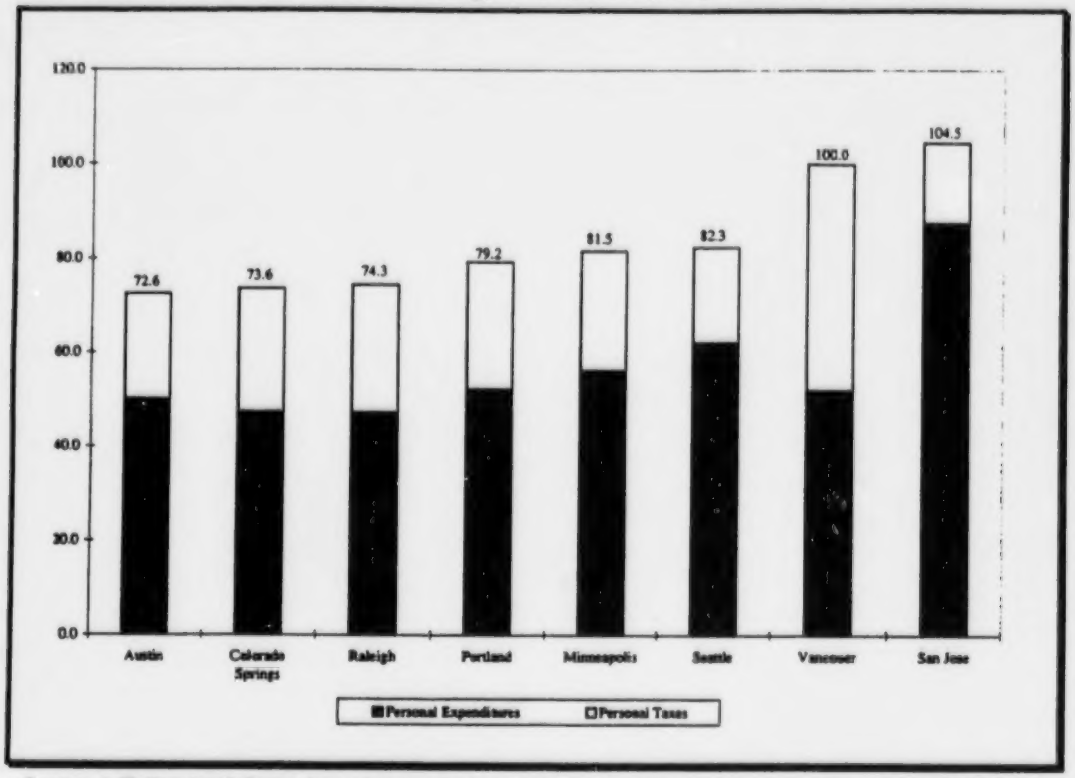
Exhibit IV-17(b)
Fischer/Runzheimer cost of living index, $100,000, Vancouver = 100.0



Source: A "Bottom-Line" Comparison of Living Costs in Selected Canadian and American Cities, Matthew Fischer & Associates, January, 1999.

Note: Analysis does not take into consideration British Columbia provincial tax cut of 2% beginning January 1999.

Exhibit IV-17(c)
Fischer/Runzheimer cost of living index, $225,000, Vancouver = 100.0



Source: A "Bottom-Line" Comparison of Living Costs in Selected Canadian and American Cities, Matthew Fischer & Associates, January, 1999.

Note: Analysis does not take into consideration British Columbia provincial tax cut of 2% beginning January 1999.

V

Strategic Advantages for High-Tech Firms Locating in British Columbia

In addition to low business costs, British Columbia also offers a number of other strategic advantages to high-tech firms, including:

- A high-quality existing labour force, combined with a streamlined immigration system that expedites the international recruitment of professional and technical talent.
- An advanced education system offering a large number of technology-related courses at every level and a network of research centres.
- Highly active research and development organizations which work to encourage and assist in the development and commercialization of new technologies.
- Strong industry organizations which work to promote the ongoing growth of their respective industries.
- A geographic location that represents an international business, transportation and communications gateway between the Asia Pacific region and North America, and that offers an outstanding quality of life.
- A wide variety of government and other programs designed to help foster the high-tech sector.

A. Workforce

For the high-technology sector, access to a highly-educated, skilled workforce is the most crucial factor in selecting a business location.

1. Size and quality of existing workforce

British Columbia's workforce totals over two million, with an annual growth rate that has averaged 2.1 percent during the past five years. The labour force in BC has grown rapidly due to both inter-provincial and international immigration. As a result of economic opportunity and an attractive living environment, British Columbia receives a significantly higher share of international immigration than its share of the national population. This international influence creates considerable opportunity for firms wanting to take advantage of a multicultural and multilingual workforce.

Canada's population is among the best-educated in the world. As illustrated in Exhibit V-1, Canada invests more in education as a percentage of GDP than any of the G-7 countries, and has the second-highest rate of student enrolment in the 5-29 year age bracket. Also, Canadian students out-performed students in Germany, Italy, and the United States, among others that participated in the Third International Mathematics and Science Study.

Exhibit V-1
Educational Indicators, G-7 nations

	Total Expenditures on Education (% GNP) 1993-96[1]	*Full-time Students per 100 People Aged 5-29 1994*[1]	*Mathematics General Knowledge Score*[2]
Canada	7.0	58	519
France	6.1	60	523
Germany	4.8	54	495
Italy	4.7	50	476
Japan	3.6	53	n/a
United Kingdom	5.4	55	n/a
United States	5.4	57	461

1. Human Development Report, *United Nations, 1999*

2. *National average for final-year secondary school,* Third International Mathematics and Science Study, *Office of Educational Research and Improvement, US Department of Education, 1999.*

Exhibit V-2, shows that education levels in BC are above the Canadian average, and that within BC, education levels in Vancouver – the main centre for high-tech activity in the province – are above the provincial average. These figures show that British Columbians in general, and Vancouverites in particular, are more likely to graduate from high school, and are more likely to continue with further education after graduation. In Vancouver, 54% of the population aged 15 years or older has some form of higher education.

Exhibit V-2
Educational attainment, population aged 15+ years, BC and Canada

	Vancouver (%)	*BC (%)*	*Canada (%)*
High school, no certificate	28	31	35
High school, with certificate	16	16	18
Some college/university, no certificate/diploma	14	13	11
College/university, with certificate/diploma	25	26	23
University, with degree	17	14	13
	100	100	100

Source: Statistics Canada, 1996 Census.

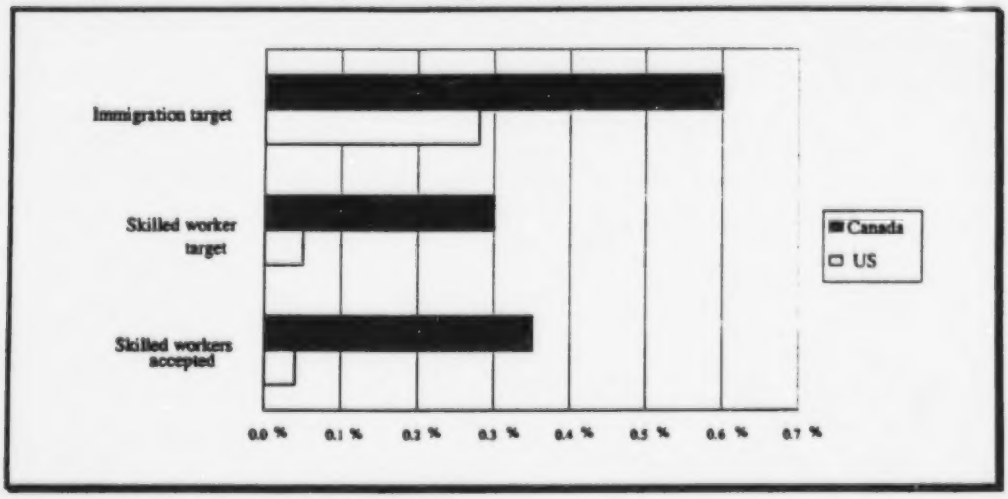
2. Immigration system targets skilled workers

Skilled employee shortages are an issue for high-tech industries everywhere. Companies must often look beyond their national labour market to find skilled workers. Immigration policies that accommodate this need to "import" high-tech talent can be a significant competitive advantage. Compared to the US, Canada's immigration policies have numerous advantages for the recruitment of well-educated, highly-skilled and entrepreneurial immigrants.

Canada's immigration policies are far less restrictive than those of the United States. Immigrants under the "skilled worker" and "business" categories represent about 50% of all migrants arriving annually in Canada. Skilled workers and business immigrants are regarded as "independent" migrants. Their applications are evaluated under a point system which recognizes education, experience, employment and personal suitability.

Exhibit V-3 shows that Canada accepts far more immigrants as a proportion of its population than does the United States. For example, Canada's 1996 per capita targets for total immigrants were approximately double those of the United States, while Canada's skilled worker target is six times higher.

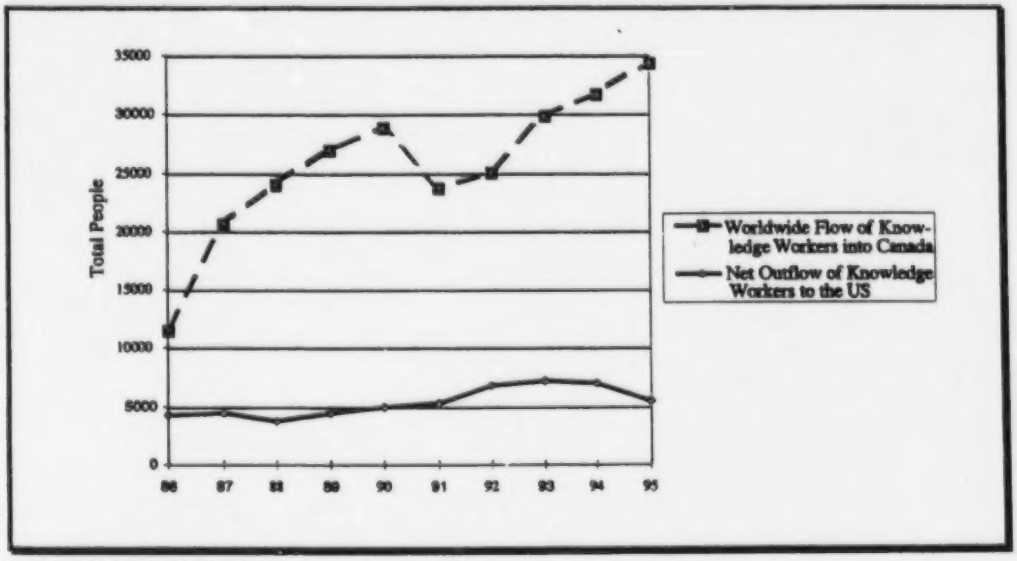
Exhibit V-3
Immigration totals as a percentage of population, 1996



Source: BC Ministry of Employment & Investment

It is sometimes claimed that Canada's "brain gain" from overseas immigration is offset by a large "brain drain" to United States. On balance, Canada has a large net "brain gain", as illustrated in Exhibit V-4.

Exhibit V-4
Net migration of knowledge workers in Canada, 1986-1995



Source: Statistics Canada

3. Recruitment and retention issues

Recruitment and retention of staff in the fast-growing high-technology sector is a major challenge to high-tech firms around the world. A high-tech labour survey entitled *Attracting and Retaining High-Tech Workers* was sponsored by KPMG and the Canadian Advanced Technology Alliance (CATA Alliance) in June, 1998. The study found that:

- The factors most frequently cited by respondents as "very important" were (1) challenging job - 81%, (2) exposure to new technology - 78%, (3) career opportunity - 76%, (4) work environment - 74%, and (5) training and development - 71%. Salary was cited as "very important" by 66% of respondents.

- Factors receiving the highest satisfaction ratings included (1) proximity to family and friends - 55%, (2) flexible work schedules - 54%, (3) community characteristics - 50%, (4) work environment - 45%, and (5) type of work - 42%.

- Factors receiving the lowest satisfaction rating included (1) stock options - 19%, (2) effective management - 23%, (3) training and development - 23%, (4) career opportunities - 26%, and (5) salary - 29%.

The ability of BC high-tech firms to attract and retain employees now and in the future will depend in large measure on their ability to create jobs with the attributes identified in the KPMG/CATA report.

B. Institutions of higher education

British Columbia's post-secondary education system is a key resource for the high-tech sector. The province has a network of six public universities, an institute of technology, as well as community colleges and other private institutions. In addition to providing training, the province's post-secondary education institutions are actively involved in applied research and development activities, and industry partnerships.

1. Workforce training

Degrees offered at the various universities and BCIT are illustrated in Exhibit V-5. A brief profile is also provided (below) for each of these institutions.

Exhibit V-5
Higher education programs: science, engineering and business

	UBC	*SFU*	*UVic*	*UNBC*	*T-BC*	*RRU*	*BCIT*
Engineering							
Electrical/Telecommunications	BMD		BMD				B,TD
Computer/Software			BMD				TD
Mechanical	BMD		BMD				TD
Metals/Materials	BMD						
Civil	BMD						TD
Chemical/Biological	BMD						
Biomedical							TD
Engineering Science		BMD					
Comp. Science/Software Systems	BMD	BMD	BMD	B	B		B,TD
Physics	BMD	BMD	BMD	B			
Mathematics/Statistics	BMD	BMD	BMD	BM			
Chemistry/Biochemistry	BMD	BMD	BMD	B			TD
Biology/Microbiology/Biomedical	BMD	BMD	BMD	BM			TD
Interactive Arts					B		
Management							
System Science		B					
Technology					B		
IT/Advanced Technology	M						
Information Systems	BM	B					
Business Admin./Commerce	BMD	BM	BM	B		BM	TD

Note: TD: Technical Diploma, B: Bachelor's, M: Master's, D: Doctoral (PhD)

a) University of British Columbia

The University of British Columbia (UBC) was established in 1915 and now has a student population of almost 35,000, making it the third largest university in Canada.

UBC has an especially strong reputation in electrical engineering, computer science, and life sciences, with degree programs being offered at the undergraduate and graduate levels. UBC has major facilities for biotech, computer systems, and microelectronics research.

b) Simon Fraser University

Simon Fraser University (SFU), has its main campus in Burnaby, a suburb of Vancouver, and also operates a satellite campus in downtown Vancouver. In four of the last eight years, Canada's Maclean's magazine ranked SFU as the best comprehensive university in Canada, based on the overall quality of its faculty and courses.

SFU is a major teaching and research university offering undergraduate, graduate and professional programs in a variety of disciplines to 23,000 students. SFU has a strong reputation in computer and engineering science, with chairs in the fields of applied artificial intelligence and optical electronics.

c) University of Victoria

The University of Victoria (UVic) located in the provincial capital of Victoria, has approximately 17,000 undergraduate and graduate students, and an alumni population of over 51,000 graduates. UVic operates Western Canada's largest co-operative education program, placing approximately 3,000 students per year into paid work terms with high-technology or other companies.

UVic maintains strong departments in computer science, electrical and computer engineering and mechanical engineering within the Faculty of Engineering. In September 1998 the faculty also began offering courses for a newly-approved software engineering degree.

d) University of Northern British Columbia

The University of Northern British Columbia (UNBC), located in Prince George, has a particular focus on the social and economic issues of the North. There are currently almost 3,400 students registered in one of about 40 degree programs at the Bachelor, Master and Doctoral levels. Undergraduate degree programs are now offered in computer and biological sciences, as well as in business administration. Master's programs are offered in mathematical, computer and physical sciences.

UNBC's Prince George campus opened in 1994, and was fully fibre-optic wired. Technology is utilized to make courses, library materials, and tutoring available to students throughout northern BC.

e) Technical University of British Columbia

The Technical University of British Columbia (TechBC or T-BC) is BC's newest university, having had its first major program launch in the Fall of 1999. TechBC is located in the Vancouver suburb of Surrey, and while currently housed in a temporary location, will be moving into a brand new facility in 2002.

TechBC was developed specifically to provide education for high-tech workers. Students can graduate with a Bachelor of Science degree in one of three major program areas: Management and Technology, Information Technology, and Interactive Arts. TechBC is also expanding to include graduate degrees in these three areas.

TechBC courses are offered in a variety of formats, with many courses delivered exclusively on-line. This focus on on-line learning also means that TechBC can provide tailor-made web-based education programs for companies looking to upgrade the skills of their workers.

f) Royal Roads University

Royal Roads University (RRU), located in the provincial capital of Victoria, is an applied university committed to delivering market-relevant programs tailored to the needs of working professionals. In order to accommodate career demands, all graduate programs are offered through a combination of short on-campus residencies and distance learning, while undergraduate programs combine the third and fourth years of the degree into an intensive 12-month cycle.

In total, seven master's degrees and two bachelor-completion degrees are currently offered, including a Bachelor of Commerce in entrepreneurial management and a Master of Business Administration in Digital Technologies Management. Several new degree programs focusing on technology are now under development. RRU also offers the Microsoft Certification Program.

g) British Columbia Institute of Technology

Founded in 1964, the British Columbia Institute of Technology (BCIT) now has two campuses in Greater Vancouver. Approximately 14,000 full-time students and 24,000 part-time students enrol annually. Regarded as one of Canada's leading technology institutes, BCIT has schools of electrical and electronics technology, computing and engineering, and biotechnology. BCIT has degree-granting status and offers Bachelor of Technology degrees in Computer Systems Technology and Environmental Engineering Technology.

2. University research centres

Each of the largest universities in the province has extensive research capabilities in the high-technology sector and all are actively involved in industry partnerships for research and development activities. A selection of BC's university high-tech research centres are profiled below.

a) University of British Columbia

UBC's Institute for Robotics and Intelligent Systems' Spacecraft Controls Laboratory was created to specialize in research in the areas of dynamics and control of spacecraft, including mobile, flexible robotic arms, variable geometry adaptive manipulators and tethered subsatellite systems. UBC also does research in software testing and specification, wireless and digital communication, and computer graphics. Its Media and Graphics Interdisciplinary Centre (MAGIC) is actively involved in digital post-production and the development of educational video games.

b) Simon Fraser University

The Centre for Systems Science (CSS) at Simon Fraser University supports multi-disciplinary activities focusing on applied science. The CSS is affiliated with the BC Advanced Systems Institute and was established with funding from the BC Government. The CSS undertakes integrated research and educational activities in advanced systems, including the fields of computing science, microelectronics, system design, artificial intelligence and robotics.

c) University of Victoria

Founded at the University of Victoria in 1987, the Laboratory for Automation, Communication, and Information systems Research (LACIR) is an on-campus, cross-disciplinary research centre. Specific research areas include software systems and software engineering, artificial intelligence and expert systems, VLSI, robotic controls, signal processing, CAD/CAM, speech synthesis, and energy systems. LACIR encourages collaborative research among its members, and with industry, government, and other BC universities.

d) TechBC

Through its business arm, TechBC Corp., TechBC is forming a number of new and future-driven applied research centres to work in collaborative partnership with BC technology companies. Research centres already in operation include the Centre for Electronic Commerce, the Centre for Educational Technology and Policy, and the Centre for Interaction.

3. University-industry liaison

British Columbia's high-tech industry has grown through a combination of investment by foreign firms and commercialization of home-grown technology. Local university research and technology transfer has supported this growth, and BC's universities are committed to developing these new knowledge-intensive industries. One tangible means of achieving this goal has been through the development of university-industry liaison offices (UILO) at each of the province's major universities and BCIT

For example, the University of British Columbia established its UILO in 1984 to link the research resources and technology opportunities of industry, the university, and its affiliated hospitals. Technology generated through UBC research has created 83 spin-off companies, which have attracted over C$633 million in local investment and created over 1,500 jobs. The real value of these spin-off companies will emerge as they become a hub for the further development of high-tech activity in British Columbia.

C. Research and development organizations

There are a number of organizations in British Columbia whose purpose is to encourage and assist in the development and commercialization of new technologies. Leading organizations include the Science Council of BC and the BC Advanced Systems Institute.

1. BC Advanced Systems Institute

The mission of the BC Advanced Systems Institute (ASI) is to ensure that advanced systems technologies (information systems, telecommunications, microelectronics and robotics) are developed, commercialized and used to aid in the growth of BC's economy. This mission is achieved by providing solutions to industry's current and future technical needs by facilitating interactions between industry and post-secondary education institutions. ASI's research programs are conducted at the most appropriate site for a given program, be that in industry or on campus.

2. Science Council of BC

The Science Council of BC (SCBC) is a Crown (government) Agency which was established for the purpose of stimulating business development and job creation through science and technology. SCBC fosters innovative research and development through funding programs which support applied R&D projects and scholarships with an industrial focus. SCBC also supports volunteer, networking and educational programs aimed at increasing knowledge, use and skills with respect to innovative science and technology.

D. Industry organizations

There are a number of industry associations in British Columbia whose purpose is to encourage the development of the province's high-technology industry. Leading industry organizations include the BC Technology Industries Association, the BC Biotechnology Alliance and New Media BC.

1. BC Technology Industries Association

The mission of the BC Technology Industries Association (TIA) is to foster the growth and development of the province's technology industries and member companies. TIA programs and services are designed to meet the needs and interests of technology companies in the areas of networking, education, public awareness, export development and government relations.

The Association also provides a forum for members to review industry issues, acquire new business knowledge from leading industry professionals, provide input on existing and proposed legislation, and generally work together to advance the industry's interests.

2. BC Biotechnology Alliance

The BC Biotechnology Alliance (BCBA) is an association for producers and users of biotechnology. On behalf of its membership, the BCBA promotes and facilitates the development of a strong commercial biotechnology industry in BC. The BCBA is operated largely by corporate members, who ensure that the organization is an effective advocate on issues affecting the industry. The BCBA also increases its members' ability to network on an international basis, and to represent industry views to the general public and government. As an agent for change, the BCBA works to improve the level of awareness and understanding of biotechnology, its contributions to society, the impetus this industry gives the economy, and the needs of the industry to enhance its growth.

3. New Media BC

New Media BC is composed of businesses, educational organizations, government agencies, and individuals whose core business is new media production or production support. The association's aim is to create a networking environment among members to assist them in developing and marketing their products. New media is a young, but growing sector in BC's high-tech industry.

E. A geographic gateway

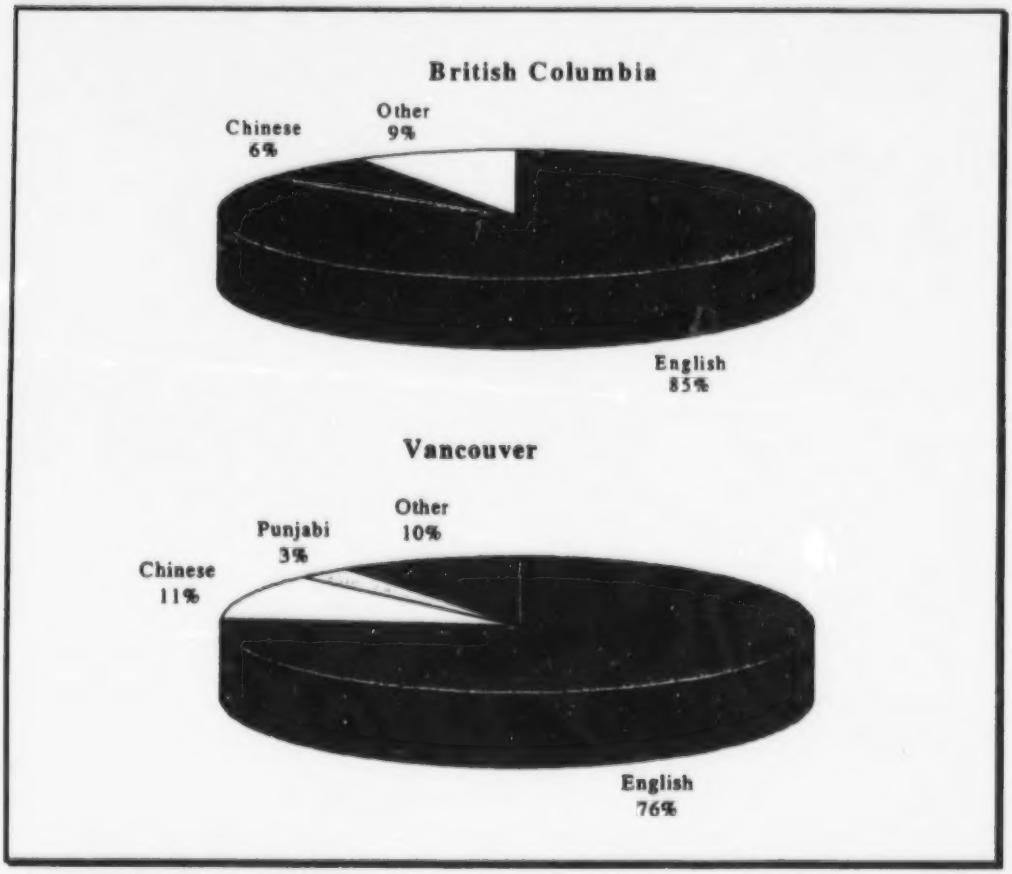
As geographic location, British Columbia represents a gateway between the Asia Pacific and North America. BC has strong cultural and business ties, and excellent physical access by air and sea, to both of these regions. British Columbia provides high-tech firms with strong infrastructure systems, and also offers an outstanding quality of life.

1. A multi-cultural province, with strong ties to Asia

International immigration has accounted for approximately half of British Columbia's 11% population growth during the past five years. As a major immigrant destination, Vancouver has a diverse ethnic heritage with almost two million residents making up a multi-cultural, cosmopolitan community.

English is the language of business and is predominant within the province. However, within the home (particularly for Vancouver), the mix of languages is considerable. As illustrated in Exhibit V-6, English and Chinese are the two most common home languages.

Exhibit V-6
Home language, 1996

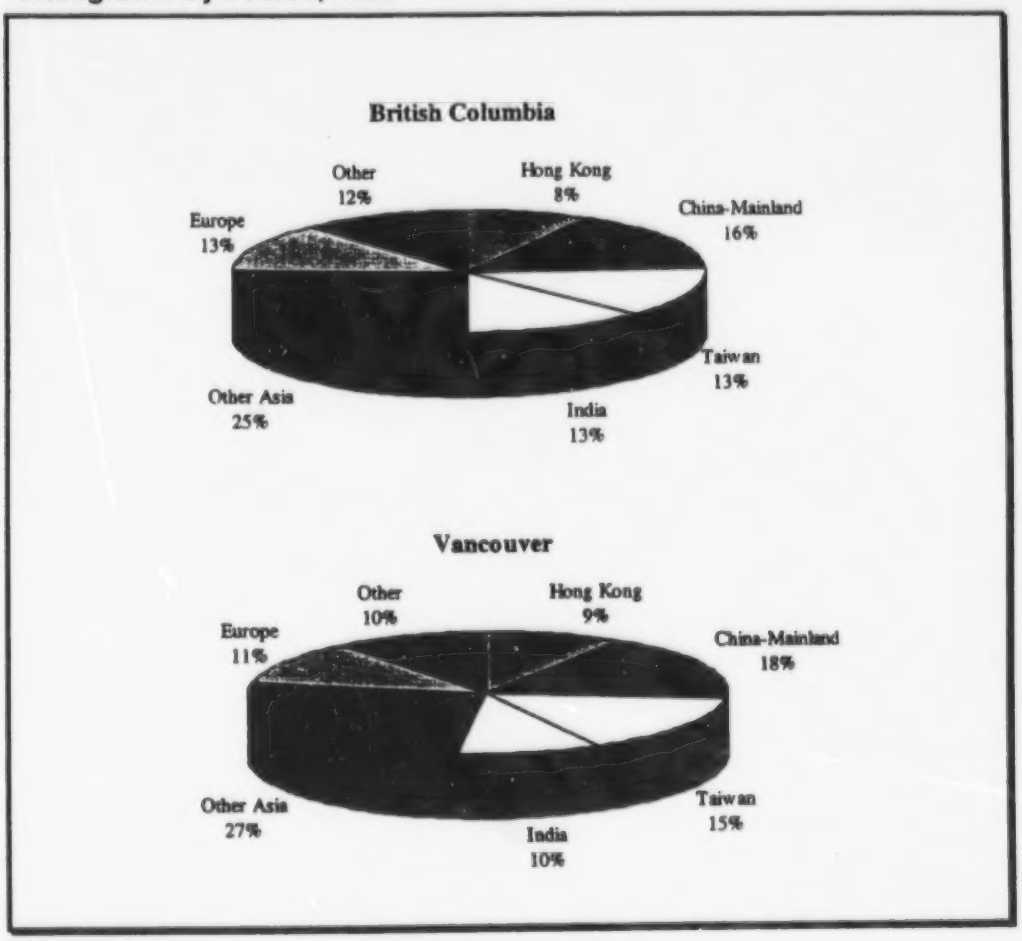


Source: Statistics Canada, 1996 Census.

British Columbia's and Vancouver's economic and social ties to Asia have grown substantially in recent years. As illustrated in Exhibit V-7, 80% of immigration to British Columbia and Vancouver in 1997 was from Asia.

The flow of immigrant-entrepreneurs to BC further illustrates the province's ability to attract international talent. Although BC has only 12% of the Canadian population, it has attracted more than a quarter of all business immigrants to Canada during the past decade, the vast majority from Asia.

Exhibit V-7
Immigrants by source, 1998



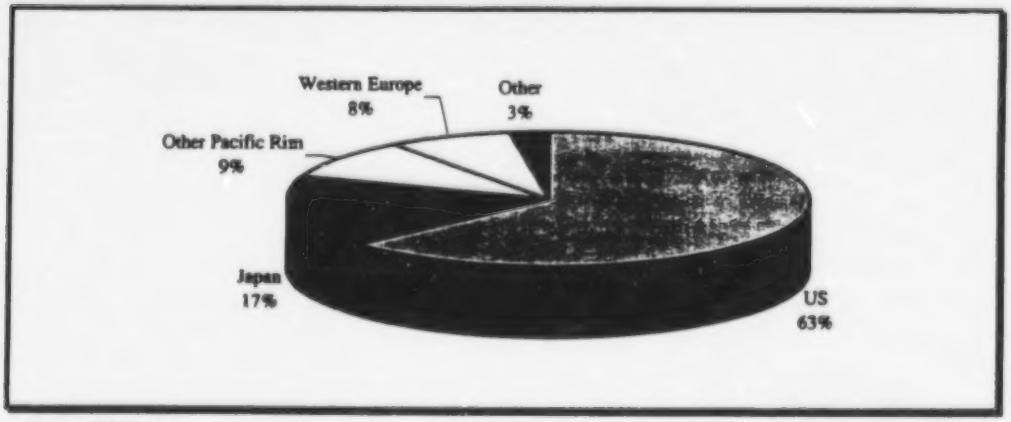
Source: BC Stats

2. International business orientation and profile

International trade has always been important to British Columbia. As illustrated in Exhibit V-8, BC's traditional US market accounts for nearly two-thirds of all exports, while 37% move offshore.

Naturally, Vancouver also houses the business infrastructure – financial institutions, trading companies, consulting and engineering firms, and government agencies – that are necessary to support this trade.

Exhibit V-8
Destination of British Columbia exports, 1998



Source: BC Stats

British Columbia's international orientation and profile have grown significantly in the 14 years since Vancouver hosted World Expo '86. In recent years, Vancouver has hosted (or is hosting) a number of major international political and business events, including:

- The 1997 Asia-Pacific Economic Co-operation (APEC) Leaders' Summit.
- The 1997 World Chinese Entrepreneurs Conference – the first time that this major business event was held outside Asia.
- The 2000 World Education Market – the world's first forum dedicated to the international business of education.

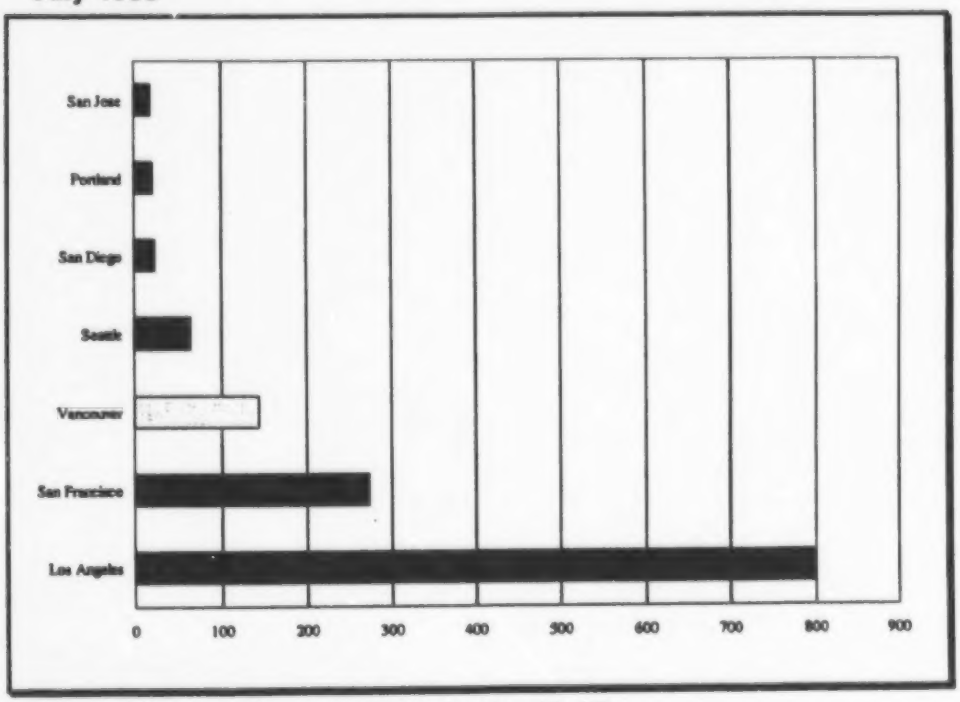
3. International accessibility

a) Air connections to the world

A well-developed air transportation infrastructure is essential to high-tech enterprises that deliver products and services globally. In 1998, approximately 78% of BC's high-tech exports to offshore markets, and 29% of exports to the US, were shipped by air.

Vancouver is a major international gateway between North America and the Asia Pacific region. Vancouver International Airport (YVR) is Canada's second largest airport, and ranks third among West Coast airports, after Los Angeles and San Francisco, in terms of non-stop, international flight departures. As illustrated in Exhibit V-9, Vancouver has considerably more overseas flights per week than Seattle, Portland, San Diego or San Jose.

Exhibit V-9
Weekly frequency of international[1] non-stop air departures
July 1999



1 International includes all countries other than Canada and the US.
Source: Back Associates Inc./Official Airline Guide Inc., YVR.

More than 20 international airlines serve destinations in Asia, Europe, the South Pacific and the Americas from YVR (Exhibits E-1 and E-2 in Appendix E). International passenger traffic has soared in the past decade, and is projected to increase from 2.1 million travellers in 1994 to 4.0 million in 2005. Freight traffic is growing at 16% annually.

YVR has recently invested C$500 million in new terminal facilities, existing terminal upgrades, a third runway (increasing airport capacity from 275,000 to 425,000 aircraft movements a year), and advanced air traffic control and instrument landing systems. In October 1999, a new 392-room business-class hotel opened in the main terminal of YVR. This hotel is the first in the world to offer in-room airline check-in.

b) Port, rail and road facilities

BC has a highly-developed and integrated rail, highway, and port infrastructure. In 1998, surface transportation accounted for 71% of BC high-tech shipments to the US, and approximately 9.5% of offshore shipments.

The province has an extensive system of ports and deep-water terminals, all of which are ice-free year-round. The Port of Vancouver is Canada's largest port. Measured in terms of cargo volumes, Vancouver is the same size as the three busiest US ports: New York, Los Angeles and Long Beach, each of which handles in the order of 60 million tonnes of cargo annually. In 1997, a new one million TEU (20-foot container equivalent unit) capacity container facility (Deltaport) was opened in Vancouver, incorporating the latest freight-handling technology.

National and provincial rail lines (CN, CP and BC Rail) link British Columbia's industrial centres to terminal points across Canada. In addition, five US rail lines including Burlington Northern and Union Pacific, serve the southern part of the province.

British Columbia's highway system permits long-distance trucking within the province and provides connections with inter-provincial and US interstate routes. The Trans-Canada Highway originates in Victoria, BC, and travels east through Vancouver, across southern BC, and continues east to provide access to all the major provinces across Canada. Travelling from the US West Coast, Interstate 5 joins BC Highway 99 at the international border just south of Vancouver, providing direct access to Vancouver from California, Oregon and Washington State.

c) Telecommunications infrastructure

British Columbia has a highly sophisticated telecommunications system, with all major centres being served by fibre-optic networks that provide for voice, image and high-speed data transmission.

Telecommunication costs in BC are highly competitive, with both local, long distance, and mobile services being open to fierce competition. The recent merger of BC's and Alberta's major telephone companies (BC Tel and Telus) promises to result in further expansion and innovation. In addition, internet connectivity in BC is above the Canadian average.

4. Outstanding quality of life

The lifestyle preferences of skilled and creative people increasingly determine where high-tech businesses choose to locate. A number of independent studies have identified lifestyle factors, including cultural and intellectual stimulation, leisure opportunities, climate, personal security, and a clean environment, as important values for technology workers, and factors which can influence decisions regarding where to work and live.

Canada has ranked as the "world's most liveable country" for the past five years in the UN's Human Development Report. According to a GALLUP poll conducted in 1995, among 18 countries representing more than 60 percent of the world's population, Canadians are among the most satisfied people in the world in terms of quality of life.

Within Canada, British Columbia stands out as a preferred location in which to live. Vancouver's natural beauty and mild, west-coast climate have long been attractions to migrants both from other regions of Canada and from around the world. Average maximum daily temperatures in Vancouver range from approximately 5°C (40°F) in January to approximately 23°C (70°F) in July. Even in January, the average minimum daily temperature in Vancouver does not fall below 0°C (32°F).

Vancouver's appeal as a place to live has been recognized around the world, as is highlighted by several recent surveys:

- In a 1999 world-wide survey on quality of living, William M. Mercer ranked Vancouver in equal-first place globally, with a quality of life that was not bettered by any other 215 cities included in the survey.

- US *Outside* Magazine[1] rated Vancouver as one of the "World's 10 Great Towns".

- A 1998 Angus Reid survey found that 82% of Vancouver residents would not choose to live in another Canadian city (assuming the same standard of living), while 45% of Toronto residents would.

- In a 1998 article on liveable cities, *US News and World Report*[2] Magazine selected six highly liveable cities from around the world, one of which was Vancouver.

Factors contributing to the high quality of life in British Columbia include excellent skiing and snow-boarding facilities, as well as hiking, rock climbing, sailing, mountain biking, and a host of other recreational opportunities, which are available throughout the province. Whistler, a world-class ski resort and year round outdoor recreational haven, is located 120 kilometres north of Vancouver.

British Columbia is also home to professional teams in hockey, basketball, football, and soccer, and plays host to a PGA golf tournament, an Indy car race, and ice skating championships.

In addition to outdoor and sporting activities, British Columbia also enjoys a lively and distinctive West Coast cultural scene, which includes both amenities and festivals devoted to film, theatre and music. The cultural scene in British Columbia has been heavily influenced by the province's multicultural character.

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[1] *Outside Magazine, June 1997.*

[2] *US News & World Report, June 8, 1998.*

F. Assistance programs for the BC high-tech industry

There are many assistance programs available through the provincial and federal government, as well as other agencies, that support the development of the high-tech sector in British Columbia. These programs can be grouped into five main categories:

- Research and development assistance programs.
- Human resource development programs.
- Financing programs.
- Export assistance programs.
- Other programs.

While a large number of programs offer some potential assistance to firms in the high-tech sector, specific rules govern the applicability of each program. The program or programs available to any particular firm will depend on its specific circumstances, and inclusion of a particular program in this section does not imply that the program would be available or applicable to all high-tech firms.

1. Research and development assistance programs

Research and development (R&D) assistance programs are available to aid BC firms investing in leading edge technology. Examples of specific programs include:

- **Scientific Research & Experimental Development (SR&ED) Programs**—Revenue Canada has established the SR&ED program as part of the corporate income tax system to provide income tax incentives to companies engaged in SR&ED activities. Incentives under the program include immediate income tax deductions and investment tax credits based on all SR&ED expenditures, including capital expenditures.

  This program has been supplemented for BC companies by the Government of British Columbia, which introduced a new tax credit for SR&ED activities in September, 1999.

  Further details of the SR&ED programs are presented in Appendix B.

- **Technology BC**—Funded by the Province of British Columbia, the purpose of the Technology BC program is to stimulate the development of science and technology applicable to economic development. Funds may be provided for research aimed at the development of new products and processes, prototype demonstration projects, and the initial application by a company of new or existing technology where an element of technical risk is involved.

2. Human resource development programs

Human resource development programs assist in the development of the skills that are required to succeed in the high-tech sector. The range of programs available in BC to assist with human resource development is summarized in Exhibit F-2 (Appendix F). Examples of specific programs available in BC include:

- **First Job in Science and Technology**—This program is designed to encourage the employment of recent science, technology and engineering graduates. This program reimburses up to 50% of a recent graduate's hourly wage, to a maximum of C$7.50 per hour, provided the graduate is working in a position that the employer would not otherwise fill during this period.

- **GREAT Scholarships**—This program provides financial assistance to students working on graduate degrees in science or engineering at BC universities. Each program is intended to assist small off-campus BC companies to improve their business capabilities through application of the candidate's technical expertise. These scholarships are offered through the Science Council of BC, a provincially-funded agency whose mission is to promote economic development in BC through innovative applications of science and technology.

3. Financing programs

Financing programs are available to assist in the financing of debt and equity for BC-based high-tech. Examples of specific programs sponsored by the Province of British Columbia include:

- **Equity Capital Program**—This program encourages private sector investment in selected economic sectors, including R&D, manufacturing and tourism. The program provides a provincial income tax credit equal to 30% of the amount invested in a venture capital corporation.

- **Employee Share Ownership Program**—This program assists with indirect investment in eligible businesses by pooling investment funds of employee groups and labour organizations. Under the Employee Share Ownership Plan, employees can benefit from the company's capital appreciation and the employer has a new source of capital for expansion or debt reduction.

4. Export assistance programs

Export assistance programs are available to assist BC companies obtain knowledge of the export process, finance their export activities, and reduce the duties paid on imported goods used in the manufacture of high-tech products for export. The range of programs available is summarized in Exhibit F-4 (Appendix F). Specific programs include:

- **Program for Export Market Development**—This Industry Canada program is designed to reduce the financial risk faced by companies first undertaking export marketing activities, or expanding their current export marketing activities into new markets. The program makes financial contributions to the company to partially cover the costs of marketing incurred, with the funds becoming repayable if the marketing initiative is successful in generating sales in the new market area.

5. Other programs

There are a variety of other programs are available to assist the growth of BC high-tech firms, including intelligence assistance, technology transfer, and tax reductions. These programs are summarized in Exhibit F-5 (Appendix F).

Appendix A

Business Scenario Used for Discussion of Taxation Issues in Appendices B to D

Appendices B to D contain detailed questions and answers in respect of common taxes which apply to high-tech companies in British Columbia, along with sample tax calculations to illustrate the application of various BC taxes, and compare the application of these taxes to equivalent taxes in Washington State, Oregon and California.

The illustrative taxation calculations included in Appendices B to D have been prepared based on a hypothetical investment and operating scenario, the details of which are set out below. This scenario is based on a high-tech manufacturing operation, carried out in BC through a wholly-owned Canadian subsidiary corporation. This scenario, and all examples based on it, are completely independent from any illustrations of costs or taxation included as part of the comprehensive business cost modelling set out in Chapter IV of this report.

All tax rates reported in Appendices B to D are current as at December 1999, unless otherwise specified. Where required, a rate of US$1.00=CDN$1.47 has been used for exchange conversions.

Due to the diverse nature of the high-technology sector, this hypothetical scenario will not mirror the actual investment and operating parameters of many high-tech companies. However, this scenario does provide a common-size base for comparing the application of various taxes in British Columbia and the West Coast US states.

A. Investment parameters

The high-technology company is assumed to commence operations by acquiring 14 acres of freehold land at a cost of US $4.2 million (US $300,000 per acre). On this site, a build-to-suit facility is constructed at a cost of US $6 million. The facility totals 120,000 square feet, leaving ample room on site for future expansion. Construction cost for the building is US $50 per square foot, with 50% of this cost assumed to represent labour.

To equip the new facility, the corporation spends US $8.2 million on manufacturing plant and equipment, with 90% of this amount representing the cost of the equipment, and 10%

the cost of installation. Office equipment costs are assumed to total US $300,000, and US $1 million is invested in capital equipment for research and development activities.

Sundry items (inventory, working capital) bring the total investment to US $20.8 million, which is financed via 60% equity (US $12.5 million) and 40% debt (US $8.3 million).

B. Operating parameters

Once operating, the corporation employs a workforce of 100. Annual revenues are US $17 million, and all income is earned from manufacturing operations. Operating costs are assumed to be equal in all locations, with net profit before tax of US $2.5 million.

The corporation also undertakes a significant program of research and development, with US $880,000 being invested annually in qualifying R&D activities. This amount is assumed to comprise 70% labour and 30% materials.

Appendix B

Answers to Frequently Asked Questions On Corporate Income Taxes

The following is a selection of frequent questions and answers regarding corporate income taxes.

1. *How does federal income tax work in BC?*

   The Canadian federal income tax rate is 38%. However, this rate is reduced by 10%, down to 28%, for income subject to income tax in any Canadian province. British Columbia provincial taxes, at the rate of 16.5%, apply to taxable income earned in the province. These basic rates are subject to adjustments detailed below. In addition, refer to Question 11 for information regarding proposed changes to the corporate income tax rate.

2. *Are there any special tax incentives for manufacturers?*

   Corporations with income from manufacturing or processing ("M&P") activities are eligible for a tax credit equal to 7% of their total M&P profits, reducing the effective federal income tax rate to 21%.

   M&P profits are calculated by a prescribed formula that determines the eligible proportion of total business income, by considering the cost of labour and capital employed in the M&P activities. This formula will result in the maximum credit of 7% applying to all income, if 75% of labour costs and 85% of capital are employed in M&P activities. These percentages allow for the fact that even "pure" M&P companies still require some human and capital resources devoted to sales and administration.

   Where a company plans to undertake both M&P and non-M&P activities (such as design or service activities), depending on the relative profitability of each activity, it may be desirable to have the manufacturing operations occur in a separate Canadian corporation, to ensure that this formula will result in the maximum amount of income being eligible for this tax credit.

   Refer to Question 11 for information regarding proposed changes to the M&P tax credit.

In addition to the M&P tax credit, tax depreciation may be claimed on most types of capital equipment used in M&P activities at a rate of 30% on a declining balance basis.

The effective combined nominal federal-provincial income tax rate (including the surtax discussed below) for manufacturing and processing income is 38.62%.

3. *When is a corporation subject to a 4% surtax on the federal Canadian rate?*

All companies are subject to the federal surtax of 4%. However, the surtax is calculated at 4% of federal tax payable, as reduced by the provincial abatement but before application of the M&P tax credit. The surtax essentially adds 1.12% to the federal nominal tax rate.

However, the surtax may be used as a credit to reduce Federal Large Corporations ("LCT") tax otherwise calculated. Any unused surtax credits may be carried forward seven years or back three years to reduce any LCT payable in those years. The federal surtax is included in the net manufacturing and processing tax rate of 38.62% noted in Question 2 above.

4. *When is a corporation eligible for investment tax credits creditable against the federal tax liability?*

A corporation is eligible for investment tax credits for scientific research and experimental development activities, as described in the answer to Question 5 below.

5. *When is a corporation eligible for special research and development credits?*

A corporation is eligible for federal investment tax credits ("ITCs") for qualifying expenditures for scientific research and experimental development ("SR&ED"). For corporations that are not Canadian-Controlled Private Corporations, ITCs are earned at the rate of 20% of qualifying current and capital expenditures. The credit is calculated on actual SR&ED expenditures and applies to all eligible expenditures—not just incremental expenditures.

In addition to ITCs on direct SR&ED costs, certain overhead expenditures which are otherwise deductible against income may also qualify for ITCs. The taxpayer may elect to calculate ITCs based on the direct overhead incurred or a "proxy amount". In general, the proxy amount is equal to 65% of qualifying salaries and wages of those employees directly engaged in qualifying SR&ED activities. The proxy method provides a simplified calculation and is usually advantageous in labour intensive SR&ED activities.

Scientific research includes not only basic and applied research but also experimental development. Experimental development includes product development, where there is a systematic investigation to overcome technological uncertainty. Exhibit B-1 provides more details on activities which qualify for these incentives.

ITCs may be claimed to offset up to 100% of the federal tax liability in a year. Unused credits may be carried forward ten years or carried back three years. ITCs claimed in any one year must be reflected in the calculation of taxable income of the following year.

Exhibit B-1
Scientific research and experimental development—qualifying activities for Canadian investment tax credits

Special tax incentives are provided to encourage corporations to invest in the field of scientific research and experimental development. SR&ED tax incentives are available for a broad range of business activities, not just those that are considered to be in the "high technology industries".

There are four categories of activities which qualify as SR&ED:

1. basic research, namely work undertaken for the advancement of scientific knowledge without a specific practical application in view;

2. applied research, namely work undertaken for the advancement of scientific knowledge with a specific practical application in view;

3. experimental development, namely work undertaken for the purpose of achieving technological advancement, for creating new or improving existing materials, devices, products or processes, including incremental improvements; and

4. work undertaken by or on behalf of the taxpayer with respect to engineering, design, operations research, mathematical analysis, computer programming, data collection, testing or psychological research, where the work is commensurate with the needs and directly in support, of work described in the first three categories listed above.

The three main criteria which determine whether activities are qualified for SR&ED treatment are scientific or technological advancement, uncertainty and content. Advancement is the discovery of technical knowledge that advances the understanding of scientific relations or technologies. Advancement refers to new knowledge, beyond current industry standards. The advancement criterion may be satisfied even if the attempted advancement is not successful. Uncertainty exists if it is not known whether the goals can be achieved or if it is uncertain which of several alternatives will be successful. The content criterion requires a systematic investigation by experimentation and analysis to reach logical conclusions, by persons whose professional skills are commensurate with the requirements of the project.

From September 1, 1999 the Province of British Columbia's SR&ED tax credit program provides credits to qualifying corporations on essentially the same basis as its federal counterpart with the following notable exceptions:

- the qualifying corporation must have a permanent establishment in BC during the taxation year;
- to be eligible, SR&ED expenditure must be carried out in BC and be incurred before September 1, 2004;
- corporations claiming an amount under the new corporation tax holiday scheme are ineligible for the BC SR&ED tax credit for the same year;
- any BC SR&ED tax credit will be considered 'government assistance' for the purposes of the Income Tax Act and will correspondingly reduce the eligible expenditure pool for the purposes of any federal SR&ED claim;
- ITCs are earned at the rate of 10% on both capital and current expenditures;
- a corporation may renounce all or part of its BC SR&ED tax credit;
- a corporation performing SR&ED work in BC under a non-arms-length contract cannot reallocate its SR&ED expenditures among other members of the related corporate group; and
- a corporation must claim all other tax credits available in computing income taxes payable prior to claim the non-refundable SR&ED credit.

In addition to the ITCs, the SR&ED incentives allow qualifying **current** and **capital** expenditures to be fully deductible in the year incurred, at the option of the taxpayer. If not required to reduce taxable income in the current year, both qualifying current and capital expenditures may be carried forward indefinitely and deducted in the future as needed. This indefinite carry forward provides an advantage for taxpayers involved in long-term SR&ED projects, as conventional tax losses can only be carried forward for a maximum of seven years.

Based on the calculations in Exhibit B-2 and the assumptions on which those calculations are based, in the first year of operations, the Corporation may be able to claim $684,000 of investment tax credits to eliminate federal and provincial taxes and create a carry-forward balance. In addition to the ITCs, additional tax deductions of $1.0 million are available as a result of the deduction for SR&ED **capital** expenditures. In a typical later year, the ITCs

available to the Corporation would be limited to $384,000, as the benefit from the capital R&D expenditure is restricted to the year in which that expenditure is made.

Exhibit B-2
An illustration of SR&ED investment tax credits, as applied to a hypothetical business example (US$'000)

	Year 1	*Later Year*
SR&ED salaries and wages[1]	616	616
Other current SR&ED costs[1]	264	264
Total current expenditures	880	880
Overhead Proxy[2]	400	400
Current SR&ED	1,280	1,280
SR&ED capital expenditures[3]	1,000	
Deductible current and capital expenditures[4]		
Federal	1,880	880
BC	1,880	880
- deductible in the current year or carry forward		
Investment Tax Credits		
Federal		
Current	256	256
Capital	200	—
BC		
Current	128	128
Capital	100	—
Total ITCs[5]	684	384

1 *Assumes current SR&ED expenditures of $880,000, 70% of which are salaries.*

2 *The overhead proxy of 65% of salaries is assumed not to exceed the total actual overhead.*

3 *Assumed capital expenditures are all or substantially all used in SR&ED activities.*

4 *Current and capital expenditures deductible are $880,000 and $1,000,000 respectively. Overhead proxy is only calculated to determine ITCs.*

5 *ITCs calculated at 20% of capital and current expenditures (including overhead proxy).*

6 *Government assistance (SR&ED credit) is assumed to be utilized in the year the related SR&ED is expensed, and therefore is added back to the expenditure pool in the following year.*

Exhibit B-3 outlines the after-tax cost of $1,000 of R&D expenditures, equally divided among wages, materials and equipment; and demonstrates the significant tax savings available for R&D activities in British Columbia.

Exhibit B-3
After-tax cost[1] of $1,000 of R&D expenditure[2] (US$'000)

Jurisdiction	*Non-incremental Expenditure*[3]	*Incremental Expenditure*[4]
	($)	($)
British Columbia[5,6]	349	349
California	592	538
Oregon[7]	613	563
Washington State[8]	659	615
Average Cost--US States	**621**	**572**
BC Cost Saving Relative To US States	**272**	**223**

[1] *Based on current legislation as at December 1999.*

[2] *Comprising $333,000 spent on each of wages, materials and capital equipment.*[9]

[3] *Total qualified R&D expenditure has not changed from prior year.*

[4] *Total qualified R&D expenditure is in excess of prior years' expenditures. US "base amount" is assumed to be less than 50% of qualified R&D expenditure. Canadian savings are reduced by prior year tax credit being deemed an income inclusion when receivable.*

[5] *Assumes manufacturing and processing rates apply for Canadian federal tax. Equivalent after-tax cost of $1,000 of R&D in British Columbia for a non-manufacturing and processing company is $285.*

[6] *In Canada, R&D tax credits increase taxable income in the following year. This impact has been included without discounting for the benefit of the tax deferral.*

[7] *For Oregon, state R&D credits are assumed to be less than one-third of the current year's tax liability, before credits.*

[8] *No Washington State credit is available due to the operations not falling within specified hi-tech categories.*

[9] *Capital equipment is depreciated using MACRS 5, half-year convention for US tax purposes and 20% straight line for accounting purposes. For both incremental and non-incremental assumptions, all future tax savings associated with depreciation are included in the current year, discounted to present value at a rate of 9.25%.*

6. *Are there any other federal tax reductions or credits, such as job creation incentives?*

No further specific statutory tax reductions or credits are currently available.

7. *Are there any other federal tax assessments?*

There are generally no other federal tax assessments, however, withholding taxes apply to certain payments to non-residents of Canada. Under the Canada-United States tax treaty, the withholding rates on payments to the United States have been reduced to 5% on dividends to a parent corporation and to 10% on interest. Royalties are subject to a 10% withholding tax; however, most royalties paid for the use of copyrights and patents are exempt from withholding tax. Management fees generally are not subject to withholding tax. Rates of withholding tax applicable to payments to residents of countries other than the United States may differ.

8. *Is there an Alternative Minimum Tax ("AMT") system in British Columbia?*

British Columbia does not have any AMT system. At the Federal level, there is no AMT system equivalent to that used in the US. The federal Large Corporations Tax ("LCT") (described at Section 3, Appendix D) effectively serves as a simple Minimum Tax system for large corporations.

9. *With respect to contract research, design and development services provided to the parent company outside of Canada, what arrangements would be acceptable under Canadian principles of intercompany transactions?*

A reasonable transfer price would be an amount that would be paid to an arm's length party for comparable services. A detailed study of the services provided and the nature and relative value of any rights retained by the Canadian company under the cost sharing arrangement, would be required to determine the actual appropriate transfer price for these services. A high degree of skill or technical knowledge required to perform the services would indicate a higher initial mark-up on costs, while a resulting license or trademark, which would generate significant income for the Canadian company, would suggest discounting of the rate.

However, a detailed study would be required to determine the appropriate mark-up in the circumstances that would satisfy both Canadian and US (or other foreign) tax authorities.

10. *Would a corporation making a new investment in British Columbia be eligible for a reduced provincial rate or tax holiday?*

    The Province of British Columbia has a tax holiday for new small businesses, but strict qualification criteria mean that the cases in which this tax holiday applies are extremely limited.

11. *Is there legislation pending (or enacted) that would change the answers to any of the previous questions?*

    In its February 2000 budget, the Canadian Government introduced a five-year plan to reduce the general rate for federal corporate income tax from 28% to 21%. As a first step in this process, the general rate for federal corporate income tax is to decrease by 1%, to 27%, on January 1, 2001. The specific dates for future tax rate reductions have not been announced at this time.

    With this plan for reducing the general corporate income tax rate, the tax credit for manufacturing and processing (M&P) income is also to be phased out. However, this will not increase the effective tax rate for M&P income, as this credit effectively reduces the tax rate on M&P income to 21%. If this plan is fully implemented, both M&P and non-M&P income will be subject to corporate income tax at a general rate of 21%.

Conclusion—Canadian and BC Corporate Income Taxes

Exhibit B-4 outlines the calculation of federal and British Columbia corporate income taxes based on a hypothetical investment model. The calculation has been prepared both for the first year of operation, when there is a significant investment in capital equipment for R&D activities, and for a typical later year with no new R&D capital expenditures.

These calculations indicate that the significant SR&ED credits available in Year 1 (see Exhibit B-2), offset federal and provincial income taxes. The effective combined federal and provincial tax rate is 7.06%. In the later year, based on this specific business scenario, lower SR&ED credits leave the company with a larger net federal and provincial tax liabilities, but the combined effective tax rate for the company is still just 25.0% of taxable income.

Exhibit B-5 provides a comparison of the effective income tax rates between BC and the three US states examined. For firms undertaking R&D activities, BC potentially has the lowest effective corporate income tax rate, due to both the manufacturing tax rate reduction and credits for research and development activities.

Exhibit B-4
Federal and British Columbia corporate income taxes (US$'000)

	Year 1	*Later Year*
Net Financial Statement Income[1]		
Manufacturing Income	2,500	2,500
Total income[1]	2,500	2,500
less: British Columbia Capital Tax (Exhibit D-6)	(17)	(62)
Taxable income	2,483	2,438
Base federal tax[2]	943	927
Provincial abatement[3]	(248)	(244)
	695	683
Surtax[4]	28	27
Manufacturing and Processing Deduction[5]	(174)	(171)
Federal tax payable	549	539
British Columbia Tax[6]	410	402
Total Federal and British Columbia Income Tax	959	941
Effective combined federal and provincial rate	38.62%	38.62%
Effect of SR&ED deductions and Credits		
Taxable income per above	2,483	2,438
less: SR&ED capital expenditures[7]	(1,000)	—
add: estimated prior year SR&ED Credit[8]	684	384
Revised taxable income	2,167	2,822
Federal taxes[9]	479	624
SR&ED Credit claimed to offset federal tax[10]	(456)	(256)
	23	368
British Columbia tax	358	466
SR&ED Credit claimed to offset BC tax[10]	(228)	(128)
	130	338
Total Federal and British Columbia Income Tax	153	706
Combined federal and provincial rate	7.06%	25.0%

1 Timing differences such as differences between accounting and tax depreciation have not been reflected.

2 Base federal tax is calculated as 38% of taxable income.

3 The provincial abatement is calculated as 10% of taxable income.

4 Surtax, which is creditable against Large Corporations Tax, is calculated as 4% of federal taxes.

5 Manufacturing and processing credit of 7% is assumed to apply to all income of the manufacturing operations.

6 British Columbia tax is calculated as 16.5% of taxable income.

7 Assume $1.0 million of capital expenditures incurred in Year 1 on qualifying SR&ED activities.

8 SR&ED credits are taxable in the following year. So as not to overstate the true value of the SR&ED credit, it has been included in taxable income in the current year, and the time value of the tax deferral has been ignored.

9 Federal taxes calculated at the effective rate after reduction for manufacturing and processing credit.

10 SR&ED credit is calculated in Exhibit B-2.

Exhibit B-5
Income taxes for manufacturing[1]

	British Columbia	*Washington*	*Oregon*	*California*
Corporation Income Tax [2]				
Federal	29.12%[3]	34.00%[4]	34.00%[4]	34.00%[4]
M&P Rate Reduction	(7.00%)[5]	n/a	n/a	n/a
Provincial/State	16.50%	n/a	6.60%	8.84%
Effective Combined Income Tax Rate, Before R&D Tax Credits[6]	38.62%	34.00%	38.36%[7]	39.83%
R&D Credits	(0–31.56)[8]	—[11]	—[11]	—[11]
Effective Combined Income Tax Rate	7.06%–38.62%	34.00%	38.36%	39.83%
Gross Receipts Tax Rate	n/a	0.484%[9]	n/a	n/a
Effective Gross Receipts Tax Rate, As % Of Taxable Income	n/a	2.17%[10]	n/a	n/a

1 Taxes are grouped based on substance rather than form. Legislated names of specific taxes in certain jurisdictions differ from the generic titles used in this study.

2 Percentage of taxable income.

3 Federal rate represents 28.00% income tax and 1.12% surtax.

4 Marginal tax rate applies to consolidated earnings in between $335,000 and $10 million. The top marginal corporate income tax rate in the US is 35%.

5 Applicable to income from manufacturing and processing operations as determined by formula.

6 Provincial income taxes in Canada are not deductible in determining federal taxable income. Effective combined tax rates reflect deductibility of US state income taxes for comparative purposes.

7 If the company is located in the City of Portland and/or Multnomah County, the company is also subject to City of Portland Business License Fee (2.2%) and/or Multnomah County Business Income Tax (1.45%). These taxes are deductible for Excise Tax and federal income tax purposes.

8 R&D credits are calculated as 20% of qualifying non-incremental current and capital expenditures. Percentage reductions in federal tax are based on the calculations and assumptions detailed in Exhibit B-4.

9 Washington Business and Occupation tax is based on gross receipts (less certain limited deductions) at different rates for different activities. The tax rate for manufacturing and wholesaling activities is 0.484%. The rate for service activities is 1.5%. A local Business and Occupation tax is also applied in certain Washington State cities.

10 Effective tax rate for manufacturing is 0.484% of gross receipts, divided by the net profit before tax ratio of 14.7% for the hypothetical business scenario, less the 34% federal income tax deduction received on payment of this state tax. This effective rate is before reductions, if any, for R&D credits.

11 Assuming that US R&D expenditure is non-incremental on an ongoing basis.

Appendix C

Answers to Frequently Asked Questions On Value Added And Sales Taxes

The following is a selection of frequent questions and answers regarding value added and sales taxes. Information is current as of April 1998 unless otherwise specified.

1. *Federal Goods and Services Tax (GST):*

   a) *In general, are corporations able to claim refunds for all Goods and Services Tax (GST) incurred and, as a result, bear no GST?*

   Yes, any corporation engaged exclusively in commercial activities for GST purposes will be entitled to recover all of the GST incurred in the course of constructing and operating the facilities in British Columbia. The only exceptions would be with respect to certain expenditures which are restricted for income tax purposes, for example only 50% of the GST incurred on meals and entertainment expenses is recoverable. However, these restricted items should be immaterial relative to most companies' overall expenditures.

   b) *Are there any fees or deposits required when registering for GST?*

   There are no fees or deposits required when registering for the GST, unless the person registering is not resident in Canada and does not have a permanent establishment in Canada, in which case security must be posted. For a corporation which is resident in Canada or has a permanent establishment in Canada, no security will be required.

2. *What is the rate of British Columbia's retail sales tax? Does the rate vary based on type of transactions?*

   The rate for the British Columbia Social Service Tax (commonly referred to as "Provincial Sales Tax" or "PST") is 7%. The rate of tax is the same for all taxable transactions, with the exception of alcohol and luxury automobiles. PST payable by corporations is included as part of the cost of the relevant expenditure and, subject to deductibility of the relevant expenditure, is deductible for income tax purposes.

3. *Does GST and PST have to be collected on sales by British Columbia corporations to foreign customers?*

No, neither GST nor PST apply to exports from British Columbia.

4. *Is the retail sales tax assessed on tangible personal property? What are the exemptions?*

PST applies to the purchase or lease of tangible personal property for use in the Province of British Columbia, subject to the following exemptions (note only those exemptions which are generally relevant to the construction and operation of typical high-technology facilities are listed):

- **raw materials**—tangible personal property acquired in order to be processed, fabricated or manufactured into, attached to or incorporated into tangible personal property for sale or lease;
- **processing materials**—prescribed materials (e.g., moulds, jigs, dies, patterns, grinding media) which will be consumed or used during the manufacturing process;
- **prototypes**—tangible personal property that is to be attached to or processed, fabricated, manufactured or incorporated into a prototype that is the product of research and development activities aimed at developing a new or improved product or process;
- **catalysts and direct agents**—used in a chemical reaction for the transformation or manufacture of a product for sale or lease;
- **electricity**—used in an electrolytic process to produce goods;
- **energy conservation materials**—prescribed materials and equipment used directly or indirectly in the conservation of energy;
- **labels**—to be attached to goods for sale;
- **prescribed safety equipment**, and
- **prescribed books, magazines and periodicals**.

5. *Is the retail sales tax assessed on services? What are the exemptions?*

PST only applies to a limited number of services, specifically:

- **legal services** that are provided in British Columbia or provided outside of British Columbia in relation to a matter connected to British Columbia;
- **telecommunications services** that originate or are received in British Columbia and billed in respect of a transmitter ordinarily situated in British Columbia or which both originate and terminate in British Columbia; and
- **certain labour services** to install, assemble, repair or maintain tangible personal property.

There are no applicable exemptions for legal and telecommunications services. However, exemptions do apply to a limited number of labour services including:

- installation of tangible personal property that once installed, becomes part of real property or that is a "fixture" (refer Question 5 below);
- assembly, repair and other services in respect of tangible personal property being fabricated or held for resale;
- tangible personal property that is exempt from PST; and
- cleaning and testing services where no repairs are done.

6. *Is the retail sales tax assessed on real property?*

PST does not apply to the purchase or lease of real property. Generally, an item affixed to land or a building other than by virtue of its own weight or utility connections will be considered real property. However, machinery, equipment or apparatus that is so affixed and used directly in the manufacture of tangible personal property, are deemed to be "fixtures" and included in the definition of tangible personal property (other than such equipment and apparatus installed for heating, lighting, air conditioning, sewage disposal or passenger or freight elevators); such "fixtures" are subject to tax.

7. *Is imported tangible personal property used for further production subject to this tax? Would equipment used in production of components be exempt?*

   Imported tangible personal property that represents raw materials for the production of goods for resale is not subject to PST. Equipment used in production would not be exempt from PST.

8. *Is there legislation pending (or enacted) that would change your answers to any of the above questions?*

   There is no legislation pending (or enacted) that would change our answers to any of the questions in this Appendix.

   However, it is possible that the Province could consider "harmonizing" its sales tax with the GST. Most tax experts believe that this will happen over the next five to ten years. Under harmonization, we anticipate that any PST currently paid by businesses will also be fully refundable through input tax credits. Newfoundland, Nova Scotia and New Brunswick (three provinces in eastern Canada) have recently harmonized their sales tax with the GST. Quebec has also introduced a value added sales tax that is largely harmonized.

Conclusion—Value Added and Sales Taxes

As illustrated in Exhibit C-1, sales tax regimes in British Columbia and the US West Coast states vary significantly, from California which has the highest sales tax cost, to Oregon, which has no sales taxes. This illustration looks at representative sales tax costs based on the hypothetical investment model. Sales tax tends to be more significant during the start-up phase than during the operating phase, due to sales tax exemptions which apply to materials used in manufacturing and in research activities.

Exhibit C-1
Sales taxes—hypothetical investment model (US$)

	British Columbia	*Washington*	*Oregon*	*California*
Value Added Tax (GST)	7%	—	—	—
Tax Fully Recoverable	Yes	—	—	—
Retail Sales/Sales and Use Tax[1]	7%[1a]	8.6%[1b]	—[1c]	8.25%[1d]
Applies to tangible personal property	Yes	Yes	n/a	Yes
Exemptions for:				
Production Equipment	No	Yes	n/a	No[4]
R&D Equipment	No[2]	Yes	n/a	No[4]
Real Property				
Construction Service Taxed	No	Yes[3]	n/a	No
Construction Materials Taxed	Yes	Yes[3]	n/a	Yes
Estimated Tax Payable by Corporation[5]	$607,600	$25,800	—	$716,100
Estimated Tax Payable by Supplier[5]	$210,000	$516,000	—	$247,500
Total Estimated Tax[6] ('000s)	$817,600	$541,800	—	$963,600

1 *Combined rate including both provincial/state sales tax, plus local and/or county government taxes.*

1a *Rate 7% throughout BC, special rates for alcohol and luxury passenger vehicles.*

1b *Washington State rate 6.5%, local rate in King County (Seattle) is 2.1%.*

1c *Oregon does not impose a sales and use tax.*

1d *California state rate 6%, local rate in San Jose is 2.25%.*

2 *Exemption provided for materials incorporated into the development of prototypes.*

3 *Tax applies to entire construction contract (materials and services).*

4 *Partial exemption for manufacturing and R&D equipment applies only to new businesses that have not previously carried on business in California. Assumed Corporation would not qualify.*

5 *Tax payable by Corporation is an estimate of the sales or use taxes directly payable by the Corporation. Tax payable by supplier is an estimate of the tax payable by suppliers that may be passed on or are included in the contract price.*

6 *For details of investment assumptions implicit in these tax estimates, refer to the hypothetical investment scenario detailed in Appendix A.*

Appendix D

Answers to Frequently Asked Questions On Payroll, Property And Capital Taxes

The following is a selection of frequent questions and answers regarding payroll, property and capital taxes.

a) Payroll related taxes

1. *What are the payroll levies or other taxes based on wages that are payable by employers in British Columbia?*

Canada Pension Plan

All employers are required to withhold a portion of their employees' salary and remit the amounts withheld to the federal government to fund the Canada Pension Plan ("CPP"). It pays prescribed benefits to employees upon retirement, death or disability. Employers are also required to pay an employer portion of CPP which matches the amounts required to be paid by the employee. Currently, the maximum pensionable earnings are C$37,400, with the first C$3,500 being exempt, thereby leaving an annual maximum contributory earnings of C$33,900. The employee and employer premiums on such contributory earnings is 3.5% for each of the two parties. The maximum cost to a corporation per employee (assuming all employees exceed the maximum pensionable earnings) would be C$1,186.50 in 1999.

Normally, company pension plans are structured to take account of the employee's eligibility for CPP benefits, so that these amounts may not represent an incremental cost to the corporation.

Employment Insurance

Corporations are also required to withhold the employee portion of Employment Insurance ("EI") contributions from each salary payment and to pay an employer's premium with respect to EI. Currently, the maximum yearly insurable earnings are C$39,000, with the employee's premium being equal to 2.55% of such earnings and the employer's premium being an amount equal to 1.4 times the employee contribution—3.57% of insurable

earnings. The maximum yearly employer premium in 1999 is C$1,392.30 for each employee. To be eligible/liable for EI coverage, an employee must work a minimum of 15 hours a week or earn at least 20% of maximum weekly insurable earnings.

Conclusion—Payroll Taxes

The total annual CPP and EI cost to a corporation varies depending upon the salaries paid to each employee. Exhibit D-1 outlines a comparison of employer-based statutory benefits and wage-based taxes for British Columbia and the three West Coast US states. In BC, statutory average payroll costs as a percentage of earnings are 3.4%, versus 7.8% to 8.7% for the US states examined. Exhibit D-2 details the statutory benefit costs in each jurisdiction for five sample employees.

Exhibit D-1
Employer-paid statutory benefits and wage-based taxes (US$)

	British Columbia	*Washington*	*Oregon*	*California*
Social insurance[1,2]	3.50%	6.20%	6.20%	6.20%
Base maximum	$25,442[3]	$72,600	$72,600	$72,600
Unemployment Insurance[1]				
Federal[4]	3.57%	6.20%	6.20%	6.20%
Base maximum	$26,531	$7,000	$7,000	$7,000
Provincial/State[5]	-	2.28%[6]	3.00%	3.40%
Base maximum	-	$24,300	$23,000	$7,000
Medical Plans[1]	-	1.45%	1.45%	1.45%
Actual Statutory Benefits as a % of Total Salary & Wages[7]	3.4%	8.4%	8.7%	7.8%

[1] *Based on percentage of gross pay, subject to base maximums where applicable.*

[2] *Canada Pension Plan, FICA (Federal Income Contribution Act).*

[3] *First $2,381 exempt.*

[4] *State unemployment insurance costs can be credited to federal costs to a maximum of 5.4% of the first $7,000 paid to each employee.*

[5] *Rates applicable to new employers.*

[6] *Rates vary by industry. Rate used here is for electronics manufacturing.*

[7] *Weighted average for five sample employees earning $20,000, $30,000, $45,000, $60,000 and $90,000.*

Exhibit D-2
Statutory benefit costs, five sample employees (US$)

	British Columbia	*Washington*	*Oregon*	*California*
Employee 1: $20,000				
Social Insurance	617	1,240	1,240	1,240
Unemployment Insurance	714	512	656	294
Medicare	–	290	290	290
Total	1,331	2,042	2,186	1,824
% of Salary	*6.7%*	*10.2%*	*10.9%*	*9.1%*
Employee 2: $30,000				
Social Insurance	807	1,860	1,860	1,860
Unemployment Insurance	947	610	746	294
Medicare	–	435	435	435
Total	1,754	2,905	3,041	2,589
% of Salary	*5.8%*	*9.7%*	*10.1%*	*8.6%*
Employee 3: $45,000				
Social Insurance	807	2,790	2,790	2,790
Unemployment Insurance	947	610	746	294
Medicare	–	653	653	653
Total	1,754	4,053	4,189	3,737
% of Salary	*3.9%*	*9.0%*	*9.3%*	*8.3%*
Employee 4: $60,000				
Social Insurance	807	3,720	3,720	3,720
Unemployment Insurance	947	610	746	294
Medicare	–	870	870	870
Total	1,754	5,200	5,336	4,884
% of Salary	*2.9%*	*8.7%*	*8.9%*	*8.1%*
Employee 5: $90,000				
Social Insurance	807	4,501	4,501	4,501
Unemployment Insurance	947	610	746	294
Medicare	–	1,305	1,305	1,305
Total	1,754	6,416	6,552	6,100
% of Salary	*1.9%*	*7.1%*	*7.3%*	*6.8%*

b) Property related taxes

1. *Property Taxes*

a) At what rate will the tax be assessed, including any municipal and school taxes?

The property tax rates in British Columbia vary depending upon the geographical location (generally the municipality although certain municipalities may have more than one rate), as well as on the type of property. To illustrate some typical rates, in the cities of Surrey and Delta (suburban Vancouver) property tax rates are approximately are $22 and $27 per $1,000 of assessed value, respectively. These two cities have seen significant commercial and industrial expansion in recent years, including numerous high-tech firms.

b) On what base will the tax be assessed?

The tax base is the assessed value of land and buildings. Generally, furniture, fixtures and equipment are not part of the assessed value. Equipment that is integral to the functioning of the building (heat, light, water, sewage, elevators, etc.) is considered part of the building.

c) How is the value of the real property determined? Fair market value? If no comparable properties exist, do you look to costs incurred? What costs would you include? Are soft costs included?

The value of the property for assessment purposes is its market value. For newly constructed properties, the British Columbia Assessment Authority ("Authority") will generally look to the costs of developing the property. Two years after completion, the Authority will generally look to sales of comparable properties to determine the fair market value. Where no comparable properties exist, the Authority will continue to look at actual costs. Generally, in such situations the Authority would look at replacement cost, with an allowance for depreciation. When costs are used as the basis for determining fair market value it is the total costs that are considered, including "soft" costs.

There is no exemption from property taxes during the construction phase of the project. The property will be appraised annually and the value of additions taken into account in arriving at the assessed value for the year.

e) How often is the property re-appraised?

In British Columbia, properties are now re-appraised annually by the BC Assessment Authority, an independent agency of the provincial government.

Conclusion—Property Tax

Exhibit D-3 outlines the property tax amounts for British Columbia and the US states under consideration. It should be noted that the assessments of property value for British Columbia property tax purposes do not include manufacturing and other equipment. Comparisons of property tax amounts should be used only as a guideline. Rates may vary significantly, based on the particular local taxing authority and any special incentives or rebates that may be available.

Exhibit D-3
Property tax (US$)

	British Columbia	*Washington*	*Oregon*	*California*
Property Tax Application				
Land & Buildings	Yes	Yes	Yes	Yes
FF&E	No	Yes	Yes	Yes
Inventory	No	No	No	No
Tax Rate[1]				
Low	$22	$10	$14	
High	$27 per 1,000	$16 per 1,000	$20 per 1,000	1.1%
Assessment % of Value	100%	100%	100%	100%
Municipalities/Counties Considered	2[2]	2[2]	2[2]	2[2]
Year Average is Based On	1999	1999	1999	n/a
Revaluation Schedule	Annual	Annual	None[3]	None[4]
Estimated Taxable Value[5]	$10,200,000	$19,700,000	$19,700,000	$19,700,000
Property Taxes in Year				
Low	$224,400	$197,000	$275,800	$216,700
High	$275,400	$315,200	$394,000	$216,700
Average	$249,900	$256,100	$334,900	$216,700

1 *BC low and high rates are an average of the light industrial and business property tax rates in the two municipalities meeting the location parameters. State rates are the same regardless of property type, low and high rates based on the average rates for the counties meeting the location parameters. Because multiple rates may apply within cities, actual rates may vary.*

2 2a *Delta and Surrey*

2b *King (city of Seattle)*

2c *Multnomah, Washington and Clackamas (City of Portland)*

2d *San Jose*

3 *Property values set at lesser of 95% of 95/96 values or 90% of 96/97 values. Tax rates apply to these values, tax may not increase by more than 3% per year. Value for newly constructed properties generally construction cost.*

4 *Unless there has been a change of ownership or new construction.*

5 *Value of land and buildings is fair market value (other than Oregon, see note 3). Cost generally used as basis of value in first few years. Value of machinery and equipment based on depreciated value. Assumed in first year cost is the basis for assessment of land, buildings and machinery and equipment.*

2. *Land Transfer Tax*

a) Does British Columbia assess a land transfer tax?

British Columbia has a land transfer tax applicable to the market value of any property transfer registered at the Land Title Office of British Columbia.

b) What rate would be assessed to a corporation purchasing land?

The rate applicable to any Corporation, Canadian or otherwise, purchasing land in British Columbia is 1% on the first C$200,000 of market value and 2% on the value in excess of C$200,000.

Exhibit D-4 sets out the land transfer taxes applicable in British Columbia and the three states under consideration. Only British Columbia and Washington State have noteworthy land transfer taxes; however, neither is significant relative to the overall scale of the proposed investment (both are under $100,000).

Exhibit D-4
Land transfer tax (US$)

	British Columbia	*Washington*	*Oregon*	*California*
Land Transfer Tax [1]	2.00%[2]	1.78%[3]	0.10%[4]	55¢ per $500[5]
Estimated Land Transfer Tax Payable [6]	$82,639[7]	$74,760[8]	$4,200[4]	$4,620[9]

[1] *Schedule does not include Mortgage Registration taxes imposed by some states*

[2] *1% rate applied to the first $136,054 in value, 2% to value over $136,054.*

[3] *State rate 1.28%, King County rate 0.5%.*

[4] *Oregon generally does not impose a land transfer tax; however, Washington county (encompassing part of Portland) levies a 0.1% land transfer tax.*

[5] *Tax applies to value of property net of any encumbrances.*

[6] *Assuming land value of $4,200,000 as per hypothetical investment scenario.*

[7] *Tax payable by purchaser.*

[8] *Tax payable by vendor, purchaser may be liable if deed not recorded.*

[9] *Tax payable by person making transfer document.*

c) Capital taxes

1. *When does the federal Large Corporations Tax apply? On what base is this tax calculated?*

Federal Large Corporations Tax ("LCT") is calculated at the rate of 0.225% on a corporation's taxable capital in excess of the corporation's share of the C$10 million capital deduction. Taxable capital includes all shareholders' equity and most liabilities, less an allowance for investments in shares or debt of other corporations. The C$10 million capital deduction is shared among other corporations in Canada that are associated with the taxpayer corporation. The application of LCT is illustrated in Exhibit D-5.

The LCT is similar to a minimum tax in that tax may be payable on capital even if the Corporation does not pay any federal income tax. Corporations that pay federal income tax can offset the 4% surtax against the Large Corporations Tax.

Exhibit D-5
Federal Large Corporations Tax (US$'000)

	US $'000's
Share Capital	$12,500
Retained Earnings	—
Total Liabilities	8,300
	20,800
Less: Current accounts payable	—
Investments in other corporations	—
	—
Taxable Capital employed in Canada[1]	20,800
Capital Deduction[2]	(6,803)
	$13,997
Large Corporations Tax @ 0.225%	$ 31

[1] *Calculated based on capital invested in property, plant and equipment. This tax also applies to retained earnings and any additional debt or capital raised.*

[2] *A capital deduction of $6.8 million (C$10 million) is allocated by agreement among associated corporations. It is assumed that other associated Canadian corporations (if any) would allocate the deduction to the corporation.*

2. *What is British Columbia's capital tax rate? On what base would the capital tax rate be assessed?*

British Columbia's capital tax is a tax on the capital of the company in British Columbia including shareholders' equity and liabilities. It can also be viewed as a tax on the assets of the company in British Columbia. Many new investors become fixated on this tax as being a barrier to new capital investment in British Columbia. However, the tax should be viewed in the context of all non-income taxes within British Columbia and other jurisdictions.

The British Columbia Corporations Capital Tax is calculated as 0.3% of Net Paid Up Capital in British Columbia. Net Paid Up Capital includes all shareholders' equity and most liabilities, less an allowance for investments in shares or debt of other corporations. For non resident corporations with a permanent establishment in British Columbia as well as in other countries, Net Paid Up Capital is the greater of the carrying amount of its Canadian assets and 12.5 times its taxable income earned in the Province. For non-resident corporations carrying on business solely in Canada throughout the tax year, capital taxes are calculated under the normal rules for resident corporations. For tax years ending in 2000, the exemption threshold for British Columbia Capital Tax is C$3.5 million, rising to C$5 million for tax years ending after 2000. British Columbia capital tax is deductible for income tax purposes.

Deductions from Net Paid Up Capital are available for costs incurred in acquiring buildings and equipment used for manufacturing or processing, and for SR&ED current expenditures that have been deferred on the company's balance sheet. The net book value of these costs are claimed in the year the costs are incurred and in the following three years.

Based on the hypothetical investment scenario, we have estimated the British Columbia capital tax that would be payable by the corporation in its first full year, and in a later year when the benefits of the various capital tax exemptions have been lost. These estimates are detailed in Exhibit D-6.

Exhibit D-6
British Columbia corporations capital tax (US$'000)

	Year 1	*Later Year*
Share Capital	$12,500	$12,500
Retained Earnings	—	—[1]
Total Liabilities	8,300	8,300
Paid Up Capital	20,800	20,800
Less: Current accounts payable	—	—
Investments in other corporations	—	—
Net Paid Up Capital	20,800	20,800
Paid Up Capital allocated to BC	20,800	20,800
Less Eligible BC M&P expenditures[2]	14,200	—
Eligible BC R&D deferred current exp.[3]	—	—
British Columbia net paid up capital	$6,600	$20,800
BC Capital Tax @ 0.3%	$ 20	$ 62

[1] *Assuming all earnings have been distributed.*

[2] *The net book value of these assets can be claimed as a deduction in the year of acquisition and the following year. Assume $14.2M of capitalized costs for buildings, machinery, and equipment used primarily for manufacturing or processing.*

[3] *R&D current expenditures deferred on the balance sheet in accordance with GAAP.*

d) Future changes

1. *Is there legislation pending (or enacted) that would change your answers to any of the above three section?*

   In March 1997 the federal government outlined proposals to increase contribution levels for Canada Pension Plan. The current employer contribution rate of 3.50% will increase to 4.95% by the year 2003 then remain constant. Prior to this announcement, CPP rates were to increase, but over a longer period of time. However, a surplus in the Employment Insurance (EI) fund allowed the federal government to reduce 1999 EI premiums to offset the cost of the 1999 CPP increase. Future CPP increases may also be offset, in full or in part, by EI premium reductions.

Conclusion—Payroll, Property and Capital Taxes

Exhibit D-7 provides an overall payroll, property and capital tax comparison, summarizing information available from other exhibits. While British Columbia is the only jurisdiction with a capital tax, this exhibit demonstrates that capital taxes are relatively minor in relation to the other fixed taxes associated with payroll and property. Due to payroll tax costs in British Columbia being less than half of the competing jurisdictions, there is a significant saving of non-income taxes to be realized by locating in British Columbia.

Exhibit D-7
Payroll, property, and capital tax comparison (US$'000)

	British Columbia	*Washington*	*Oregon*	*California*
Payroll Tax [1]	167	412	426	383
Property Tax[2]	250	256	335	217
Capital Tax				
Federal[3]	31	—	—	—
BC[4]	20-62	—	—	—
Total	468-510	668	761	600

[1] *Payroll tax cost based on 100 employees earning average salaries of $49,000/year. Payroll taxes as per Exhibit D-2.*

[2] *Exhibit D-3*

[3] *Exhibit D-5*

[4] *Exhibit D-6*

Appendix E

Air Service From Vancouver International Airport

Exhibit E-1
Scheduled non-stop air services from Vancouver to the United States

Destination	*Weekly Frequency*	*Destination*	*Weekly Frequency*
Boston	7 flights	Maui	1 flight
Chicago	42 flights	Minneapolis	21 flights
Dallas	37 flights	New York	21 flights
Denver	21 flights	Phoenix	14 flights
Detroit	7 flights	Portland	79 flights
Honolulu	10 flights	Salt Lake City	7 flights
Houston	14 flights	St. Louis	7 flights
Las Vegas	7 flights	San Francisco	63 flights
Los Angeles	89 flights	Seattle	222 flights
		Total	**669 flights**

Source: YVR, Summer 1999 flight data.

Exhibit E-2
Scheduled non-stop international air services from Vancouver

Destination	*Weekly Frequency*	*Destination*	*Weekly Frequency*
Asia Pacific		**Europe**	
Beijing	8 flights	Amsterdam	7 flights
Hong Kong	25 flights	Frankfurt	7 flights
Nagoya	7 flights	London	28 flights
Osaka	7 flights		42 flights
Seoul	9 flights		
Shanghai	1 flight	**Latin America**	
Taipei	20 flights	Mexico City	2 flights
Tokyo	23 flights		
	100 flights	**Total**	**144 flights**

Source: YVR, Summer 1999 flight data.

Appendix F

Government And Other Assistance Programs For The BC High-tech industry

Exhibit F-1
Research and development assistance programs

Name	*Program Administrator*
Product Development Fund	Advanced Systems Institute
Forestry Innovation Development Program	Advanced Systems Institute
Industrial Partnership Program	Advanced Systems Institute
Strategic Research Program	Advanced Systems Institute
Health Applied R&D Program	BC Institute of Technology
Scientific Research & Experimental Development Tax Credit Program	Revenue Canada
British Columbia Scientific Research and Experimental Development (BC SR&ED) tax credit program	BC Ministry of Finance and Corporate Relations
BC Health Research Foundation	BC Ministry of Health
Technology and Applications Development Program	CANARIE
Health Services Research Fund	Medical Research Council
Industrial Research Assistance Program	National Research Council
Technology Assistance Program	PACE Technologies
Technology BC	Science Council of BC

Source: BC Government, January 2000.

Exhibit F-2
Human resource development programs

Name	*Program Administrator*
ASI Technology Demonstration Network	Advanced Systems Institute
Industrial Fellowship Program	Advanced Systems Institute
First Job in Science and Technology	BC Information, Science and Technology Agency
Micro-business Program	Business Development Bank of Canada
High Tech Co-Op Program	BC Ministry of Advanced Education, Training and Technology
GREAT scholarships	Science Council of BC
First Jobs in Science and Technology	Western Economic Diversification Canada
International Trade Personnel Program	Western Economic Diversification Canada

Source: BC Government, January 2000.

Exhibit F-3
Financing assistance programs

Name	*Program Administrator*
Advanced Technology Innovation Fund	Advanced Systems Institute
BC Knowledge Development Fund	BC Ministry of Advanced Education, Training and Technology
Business Immigration Program	BC Ministry of Employment and Investment
Equity Capital Program	BC Ministry of Small Business, Tourism and Culture
Employee Share Ownership Program	BC Ministry of Small Business, Tourism and Culture
BIRC Corporation Fund	BIRC Corporation
Small Business Financing	Business Development Bank of Canada
Venture and Term Loans	Business Development Bank of Canada
Working Capital for Growth Program	Business Development Bank of Canada
Patient Capital Program	Business Development Bank of Canada
Knowledge Based Industries Loan Fund	Business Development Bank of Canada and Western Economic Diversification Canada
Progress Payment Program	Canadian Commercial Corporation
Business Improvement Loans	Industry Canada
Northstar Trade Finance	Northstar Trade Finance Inc.
Working Opportunity Fund	GrowthWorks Capital Ltd.
Unsolicited Proposals Brokerage Service	Public Works; Government Services Canada; Western Economic Diversification Canada
Biotechnology, Health and Knowledge-Based Industry Loan Funds	Royal Bank of Canada/Western Economic Diversification Canada
Environmental Innovation Program	Supply and Services Canada
Environmental Technology Loan Program	TDI Bank/Western Economic Diversification Canada

Source: BC Government, January 2000.

Exhibit F-4
Export assistance programs

Name	*Program Administrator*
BC Export Fund	BC Mercantile Corporation
Export Receivable Financing	Business Development Bank of Canada
Working Capital for Exporters	Business Development Bank of Canada
NEXPRO	Business Development Bank of Canada
Progress Payment Program	Canadian Commercial Corporation
Program for Export Market Development	Industry Canada
Inward Processing Program	Revenue Canada
Duty Drawback Program	Revenue Canada

Source: BC Government, January 2000.

Exhibit F-5
Other assistance programs

Name	*Program Type*	*Program Administrator*
Power for Jobs Program	Power Cost Reduction	BC Ministry of Employment and Investment
Interim Comparisons—Productivity Improvement Service	Intelligence Assistance	Industry Canada
Market Assessment of Research and Technology	Intelligence Assistance	PACE Technologies
Technology Partnerships Canada Fund	Product Development	Technology Partnerships Canada
Technology Commercialization Program	Provincial Government Procurement	BC Purchasing Commission
Small Business Tax Deduction Program	Tax Reduction	Revenue Canada
Technology Partnerships Program	Technology Transfer	Natural Sciences & Engineering Research Council of Canada

Source: BC Government, January 2000.